User Manual

Allen-Bradley

CENTERLINE 2100 Motor Control Centers EtherNet/IP Network Adapter

Catalog Numbers 2100-ENET Series A FRN 1.XXX

Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
http://www.odva.org	Accesses the Open DeviceNet Vendors Association (ODVA) website.
EtherNet/IP Media Planning and Installation Manual(1), publication ODVA Pub. 148	Provides general guidelines for planning and installing an EtherNet/IP Media.
EtherNet/IP Network Infrastructure Guidelines(1), publication ODVA Pub. 35	Provides general guidelines for the network infrastructure for an EtherNet/IP Media.
Ethernet Design Considerations Reference Manual, publication ENET-RM002	Provides general guidelines for the performance application solution for an EtherNet/IP Media.
Getting Results with RSLinx® Guide, and online help, publication LINX-GR001	Provides general guidelines for installing and navigating the RSLinx Classic software.
RSLogix™ 5 Getting Results Guide, and online help, publication LG5-GR002	Provides general guidelines for installing and navigating the RSLogic 5 software.
RSLogix 500 Getting Results Guide, and online help, publication LG500-GR002	Provides general guidelines for installing and navigating the RSLogic 500 software.
RSLogix 5000 Getting Results Guide, publication LG500-GR002	Provides general guidelines for installing and navigating the RSLogic 5000 software.
EtherNet/IP Modules in Logix5000 Control Systems User Manual, publication ENET-UM001	Provides general guidelines for using EtherNet/IP communication modules with a Logix5000™ controller.
Enhanced and Ethernet PLC-5 Programmable Controllers User Manual, publication 1785-UM012	Provides general guidelines for designing, operating, and maintaining an Enhanced and Ethernet PLC-5® programmable controller system.
SLC 500 Modular Hardware Style User Manual, publication 1747-UM011	Provides general guidelines for designing, installing, programming, or troubleshooting control systems with a SLC™ 500 programmable controller.
MicroLogix™ 1100 Programmable Controllers User Manual, publication 1763-UM001	Provides general guidelines for designing, installing, programming, or troubleshooting control systems that use MicroLogix 1100 controllers.
MicroLogix 1400 Programmable Controllers User Manual, publication 1766-UM001	Provides general guidelines for designing, installing, programming, or troubleshooting control systems that use MicroLogix 1400 controllers.
IntelliCENTER® Technology with EtherNet, publication 2100-TD031	Describes cable system construction and components associated with an EtherNet/IP network.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation® industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

(1) Use this link to the ODVA EtherNet/IP library for these publications: http://odva.org/Home/ODVATECHNOLOGIES/EtherNetIP/EtherNetIPLibrary/tabid/76/Default.aspx.

You can view or download publications at http:/www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative. For information such as firmware updates or answers to product-related questions, go to the Support website at http://www.rockwellautomation.com/rockwellautomation/support.

Rockwell Automation Support

Rockwell Automation, Inc. offers support services worldwide, with over 75 sales/support offices, over 500 authorized distributors, and over 250 authorized systems integrators located through the United States alone. In addition, Rockwell Automation, Inc. representatives are in every major country in the world.

Local Product Support

Contact your local Rockwell Automation, Inc. representative for the following:

- Sales and order support
- Product technical training
- Warranty support
- Support service agreements

Technical Product Assistance

For technical assistance, review the information in Chapter 7 first. If you still have problems, then access the Rockwell Automation Technical Support website at https://rockwellautomation.custhelp.com or contact Rockwell Automation, Inc.

Conventions Used in This Manual

This manual provides information about the adapter and using it with an E3/E3 Plus™ Solid State Overload (firmware revision 5.*xx* or later) or 825-P Modular Protection System (firmware revision 65.*xx* or later). Other firmware revisions are not fully compatible with the 2100-ENET adapter and must be upgraded to a supported revision of firmware (See Update the E3 Plus or 825-P on page 24). The adapter cannot be used with other devices. If another DeviceNet native device is connected to the 2100-ENET adapter, an I/O connection is not supported through the 2100-ENET adapter.

The following conventions are used throughout this manual:

- The E3/E3 Plus Solid State Overload is referred to as 'E3 Plus' throughout this manual. The 825-P Modular Protection System is referred to as '825-P'. When being referred to together, 'end device' is used.
- Parameter names are shown in the format Parameter xx - [*]. The xx represents the parameter number. The * represents the parameter name—for example Parameter 01 - [L1 Current].
- The firmware release is displayed as FRN X.xxx. The 'FRN' signifies Firmware Release Number. The 'X' is the major release number. The 'xxx' is the minor update number.

- Screen shots in this manual were taken from the following software packages. Your screen can appear slightly different if your version of the software is not the same:
  - RSLinx software, version 2.51
  - RSLogix 5 software, version 7.20
  - RSLogix 500 software, version 7.20
  - RSLogix 5000 software, version 19

Studio 5000 Environment

The Studio 5000™ Engineering and Design Environment combines engineering and design elements into a common environment. The first element in the Studio 5000 environment is the Logix Designer application. The Logix Designer application is the rebranding of RSLogix 5000 software and will continue to be the product to program Logix5000 controllers for discrete, process, batch, motion, safety, and drive-based solutions.

The Studio 5000 environment is the foundation for the future of Rockwell Automation® engineering design tools and capabilities. This environment is the one place for design engineers to develop all of the elements of their control system.

Notes:

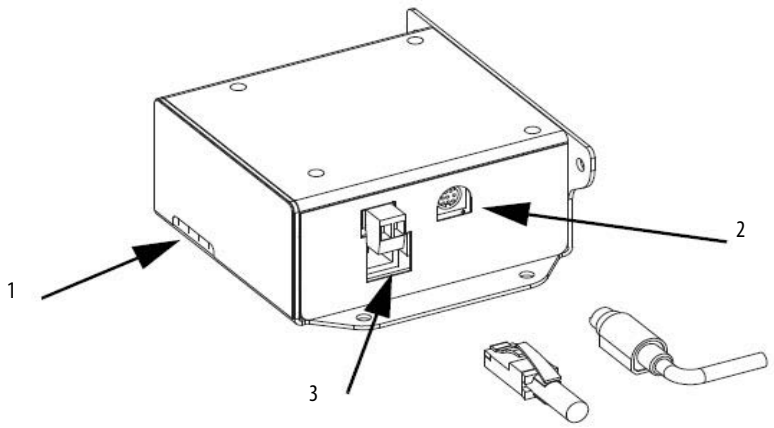
Getting Started

The adapter is for use only with the E3 Plus (firmware revision 5.xx or later) or 825-P (firmware revision 65.xx or later). Other firmware revisions are not fully compatible and must be updated to a compatible firmware revision (see Update the E3 Plus or 825-P on page 24).

Adapter Components

The adapter has these components.

Figure 1: Components of the Adapter



Item	Part	Description
1	Status Indicators	Four status indicators for the DeviceNet, adapter, and network connection.
2	E3 Connector	This connector is provided for the connection to the E3 Plus or the 825-P.
3	Ethernet Connector	An RJ-45 connector for the Ethernet cable. The connector is CAT-5 compliant to be sure of reliable data transfer on 100Base-TX Ethernet connections.

The E3 Plus and 825-P must be set to node 63 and have a communication rate of 500 Kpbs (or have the autobaud enabled). This is the default state of each of these devices.

Features

The features of the adapter include the following:

- Can be panel-mounted or DIN Rail Mounted with PN-107433 available through your Allen-Bradley distributor. The adapter can be mounted with either two or four screws in any orientation necessary.
- Grounding is provided through the housing. Grounding is to be provided by one of the panel mounting holes.

- Compatibility with IntelliCENTER software for parameter configuration of the end device. A Bootstrap Protocol (BOOTP) server can be used to configure the network address for the adapter.
- Status indicators that report the status of the end device communication, the adapter, and network.
- Explicit Messaging support to the connected device.

Compatible Products

At the time of publication, compatible products include the following:

- E3/E3 Plus Overload Relays
- 825-P Modular Protection System

Required Equipment

This section lists the equipment shipped with the adapter and what supplies you need.

Equipment Shipped with the Adapter

When you unpack the adapter, verify that the package includes the following:

- (1) 2100-ENET Adapter
- (1) 0.3 m 2100-ENET adapter to DeviceNet Cable to connect the end device to the adapter

User-supplied Equipment

To install and configure the adapter, you must supply the following:

- A small flathead screwdriver
- Ethernet cable - refer to the EtherNet/IP Network Infrastructure Guidelines, publication ODVA, Pub. 35
- Ethernet switch – refer to the Ethernet Design Considerations Reference Manual, publication ENET-RM002
- Configuration tool, such as the following:
  - IntelliCENTER software, version 3.00.01 or later
  - BOOTP Server, version 2.1 or later (network setup only)
- Controller configuration software (such as RSLogix 5 or RSLogix 500 software or the Studio 5000 environment)
- A personal computer connection to the EtherNet/IP network

Safety Precautions

Read the following safety precautions carefully.

ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting control I/O to the end device, the end device can fault when you reset the adapter. Determine how your end device responds before resetting an adapter.

ATTENTION: Risk of injury or equipment damage exists. Various parameters in the end device let you determine the action of the adapter and connected end device if I/O communication is disrupted or the controller is idle. By default, these parameters turn off the outputs of the connected E3 Plus and 825-P. You can set these parameters so that outputs react as desired (for example, to keep the motor running). Take precautions to be sure that the settings of these parameters do not create a risk of injury or equipment damage. When commissioning the end device, verify that your system responds correctly to various situations (for example, a disconnected cable or a faulted controller).

ATTENTION: Risk of injury or equipment damage exists. When a system is configured for the first time, there can be unintended or incorrect machine motion. Disconnect the motor from the machine or process during initial system testing.

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation, Inc. does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

Quick Start

This section is provided to help experienced users quickly start using the adapter. If you are unsure how to complete a step, refer to the referenced chapter.

Step	Action	Refer to
1	Review the safety precautions for the adapter.	Throughout This Manual
2	Verify that the end device is properly installed.	End Device User Manual
3	Install the adapter. Verify that the end device is not powered. Then, connect the adapter to the network by using an Ethernet cable. Connect the end device by using the 2100-ENET to DeviceNet cable. Use the panel mounting holes to secure and ground the adapter to the mounting surface. The DIN Rail adapter can also be used to mount the adapter. When installing the adapter by using the DIN Rail adapter, the following parts are needed: (1) PN-107443: DIN Rail Adapter (2) 419062-3PEF: M3 x 0.5 flat head screw	Chapter 2, Install the Adapter
4	Apply power to the adapter. The adapter requires 24V DC to operate. This connection also supplies 24V DC to the end device for the powerup and DeviceNet communication to the 2100-ENET adapter.	Chapter 2, Install the Adapter
5	Configure the adapter. Set the IP Address, subnet mask, and gateway address for the adapter. Important: These are the only parameters that need to be configured in the adapter because all of the other configuration lies with the end device. Configure the end device parameters as required by your application. Important: The node address must be 63 and the data rate must be either 500 Kpbs or set to autobaud in the end device.	E3 Plus or 825-P User Manual and Chapter 3, Configure the Adapter
6	Configure the controller to communicate with the adapter. Use a controller configuration tool, such as RSLogix software, to configure the master on the EtherNet/IP network to recognize the adapter and end device.	Chapter 4, Configure the I/O
7	Create a ladder logic program. Use a controller configuration tool, such as RSLogix software, to create a ladder logic program that enables you to do the following: • Control the adapter and connected drive by using I/O. • Monitor or configure the end device by using Explicit messages.	Chapter 5, Using the I/O Chapter 6, Using Explicit Messaging

Install the Adapter

This chapter provides instructions for installing the adapter.

Prepare for an Installation

Before installing the adapter, refer to these guidelines:

- Make sure the Ethernet switch is the correct type. A managed switch that supports Internet Group Management Protocol (IGMP) snooping is usually recommended. An unmanaged switch can be used instead if RSLogix 5000 software, version 18 or later, is used and all devices on the network are configured for unicast I/O. For more details, see the following documents:
  - EtherNet/IP Media Planning and Installation Manual, ODVA publication 148
  - EtherNet/IP Network Infrastructure Guidelines, ODVA publication 35
  - Ethernet Design Considerations Reference Manual, Rockwell Automation publication ENET-RM002
- Understand IGMP Snooping/Ethernet Switches

  The 2100-ENET adapter is a multicast device. In most situations, an IGMP snooping (managed) switch is required. If more than one 2100-ENET adapters are connected to the switch, a managed switch is required—otherwise the end device can fault on a communication (comms) loss. The 2100-ENET adapter, RSLogix 5000 software, version 18 or later, and a ControlLogix® or CompactLogix™ controller supports unicast. When all Ethernet connections are set up as unicast devices in RSLogix 5000 software, then an IGMP snooping (managed) switch is not needed.

  Much of EtherNet/IP network implicit (I/O) messaging uses IP multicast to distribute I/O control data, which is consistent with the CIP producer/consumer model. Historically, most switches have treated multicast packets the same as broadcast packets. That is, all multicast packets are re-transmitted to all ports.

IGMP snooping constrains the flooding of multicast traffic by dynamically configuring switch ports so that multicast traffic is forwarded only to ports associated with a particular IP multicast group.

Switches that support IGMP snooping (managed switches) learn which ports have devices that are part of a particular multicast group and forward only the multicast packets to the ports that are part of the multicast group.

Be careful as to what level of support a switch has of IGMP snooping. Some layer 2 switches that support IGMP snooping require a router, which could be a layer 3 switch, to send out IGMP polls to learn what devices are part of the multicast group. Some layer 2 switches can use IGMP snooping without a router sending polls. If your control system is a stand-alone network or is required to continue performing if the router is out of service, make sure the switch you are using supports IGMP snooping without a router being present:

- Refer to Appendix A for the number of CIP connections supported by the 2100-ENET adapter.
- Verify that you have all required equipment. Refer to Required Equipment on page 10.

Connect the Adapter to the End Device

1. Connect the circular connector end of the 2100-ENET adapter-to-DeviceNet cable to the PORT connector on the bottom of the 2100-ENET.
2. Connect the DeviceNet connector end of the 2100-ENET adapter-to-DeviceNet cable to the end device.
3. Configure the end device's DeviceNet address to node 63 by following the instructions provided in the appropriate end device user manual.
4. Configure the end device's DeviceNet data rate to 500 Kpbs following the instructions provided in the appropriate end device User Manual.

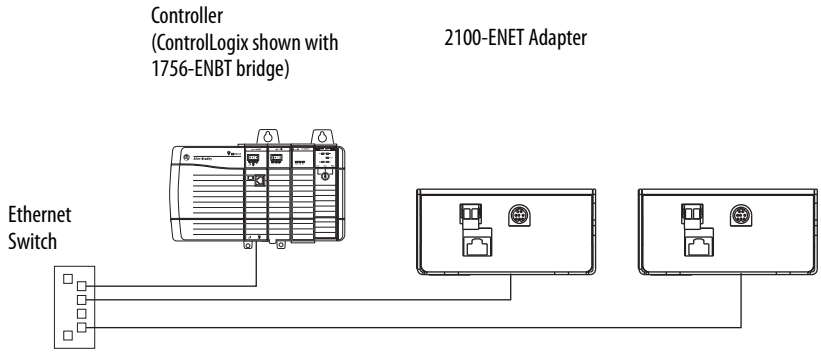
Connect the Adapter to the Network

Follow these steps to connect the adapter to the network.

1. Connect one end of an Ethernet cable to the network.

   See following graphic for an example of wiring to an EtherNet/IP network.

Connecting the Ethernet Cable to the Network



2. Route the other end of the Ethernet cable to the EtherNet/IP network connector on the bottom of the 2100-ENET adapter.

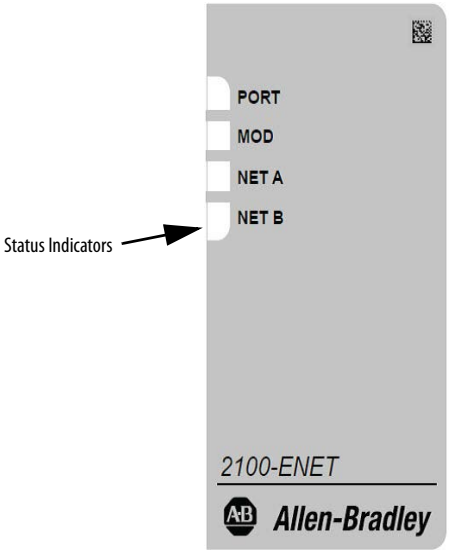
Apply Power

Connect 24V power to the DC+ connector on the bottom of the 2100-ENET adapter. When power is supplied to the adapter for the first time, its topmost status indicator is steady green or flashing green after an initialization. If it is red, there is a problem. Refer to Troubleshooting, Chapter 7.

Start-up Status Indications

After power has been applied, the status indicators can be viewed on the front of the 2100-ENET adapter (Figure 2).

Figure 2: 2100-ENET Adapter



After installing the adapter and applying power, refer to Table 8 on page 58 for a description of the status indicators.

Commission the Adapter

To commission the adapter, you must set a unique IP address on the network. (Refer to the Glossary for details about IP addresses.) After installing the adapter and applying power, you can set the IP address by using a BOOTP server or by setting adapter parameters. See Chapter 3 for details.

By default, the adapter is configured so that you must set the IP address by using a BOOTP server. To set the IP address by using adapter parameters, you must disable the BOOTP feature. See Using BOOTP on page 17 for details.

Configure the Adapter

This chapter provides instructions and information for setting up the adapter.

For a list of E3 Plus or 825-P parameters, refer to the appropriate user manual. For definitions of terms in this chapter, refer to the Glossary.

Configuration Tools

The adapter does not have any parameters that need to be configured. The only items that need to be configured are the IP Address, Subnet Mask and Gateway Address. This can be done only with a BOOTP Server.

Using BOOTP

By default, the adapter is configured so that you can set its IP address, subnet mask, and gateway address by using a BOOTP utility. You can select from a variety of BOOTP utilities. These instructions use the Rockwell Automation BOOTP Server, version 2.3 or later, a free standalone program that incorporates the functionality of standard BOOTP utilities with a graphical interface. It is available from http://www.software.rockwell.com/support/download/detail.cfm?ID=3390. Refer to the Read Me file and online Help for directions and more information.

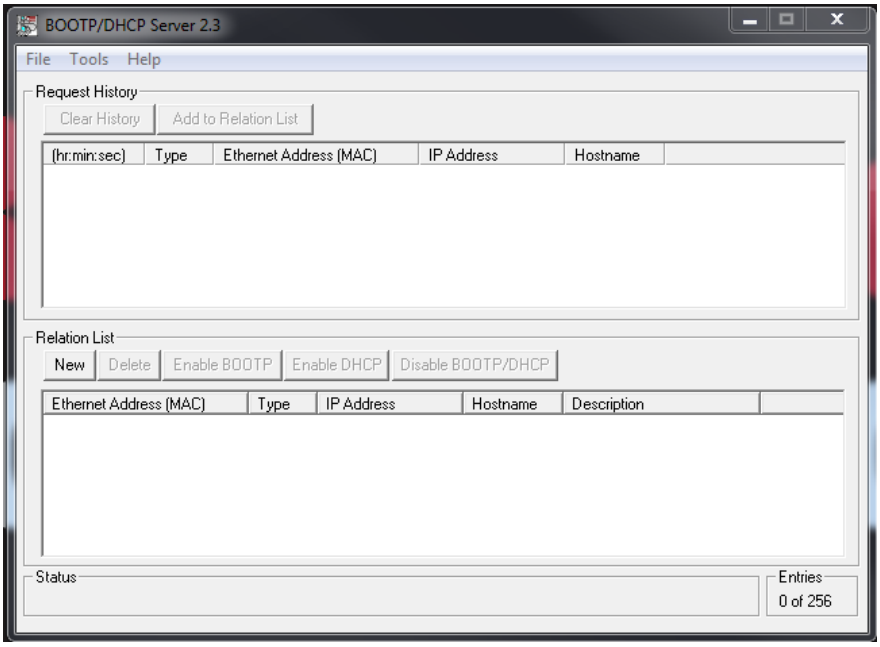
TIP Many switches and routers support BOOTP as well and can configure this information automatically. The Stratix 6000™ switch is an example of a switch that supports BOOTP.

Configure the Adapter by Using the BOOTP Server

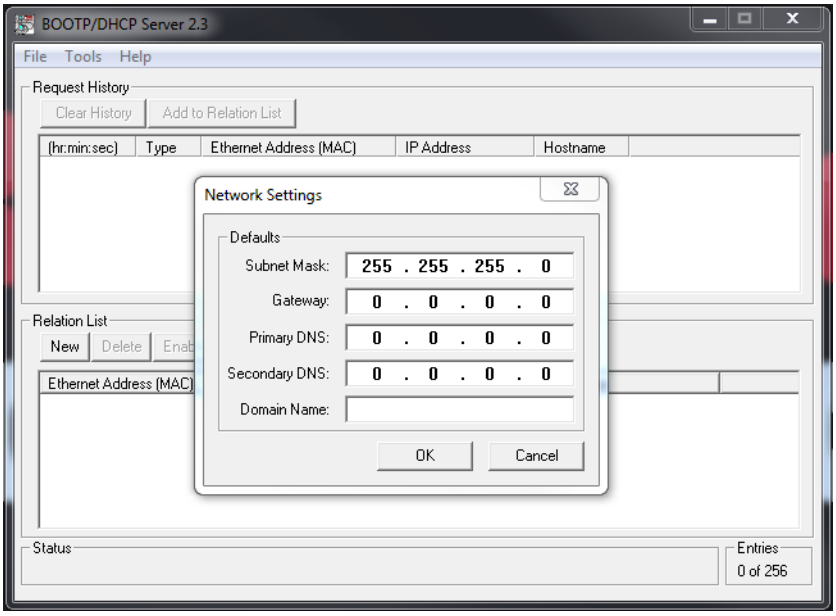
Connect your personal computer to the network the 2100-ENET adapter is connected. It can be connected directly to your personal computer, if a network does not exist.

ATTENTION: Do not apply power to the 2100-ENET adapter until directed to do so.

1. Start your BOOTP program.

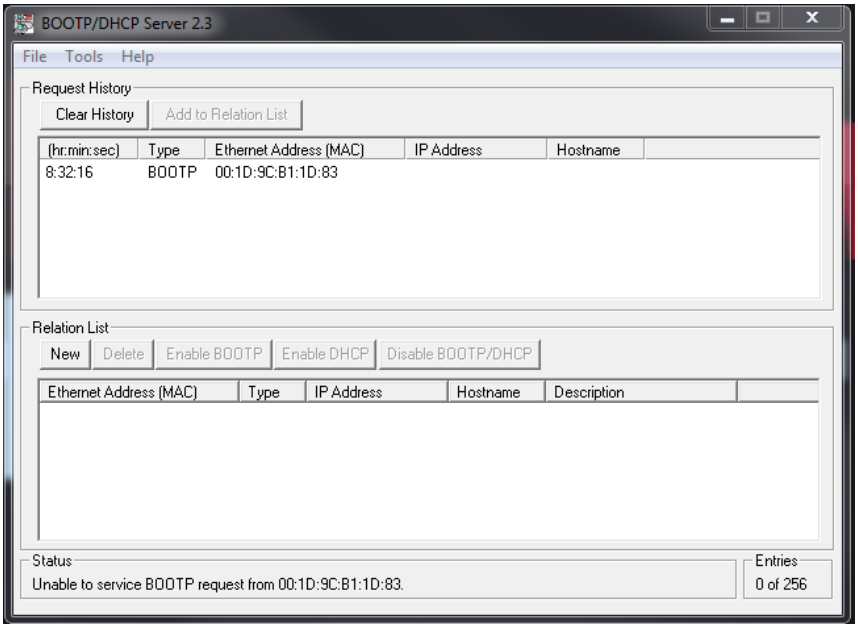


TIP From the Tools menu, choose Network Settings. Verify that the Subnet Mask and the Gateway Address match those of your network. If necessary, change the values to match your network.



2. Click OK.
3. Apply power to the non-configured 2100-ENET adapter.

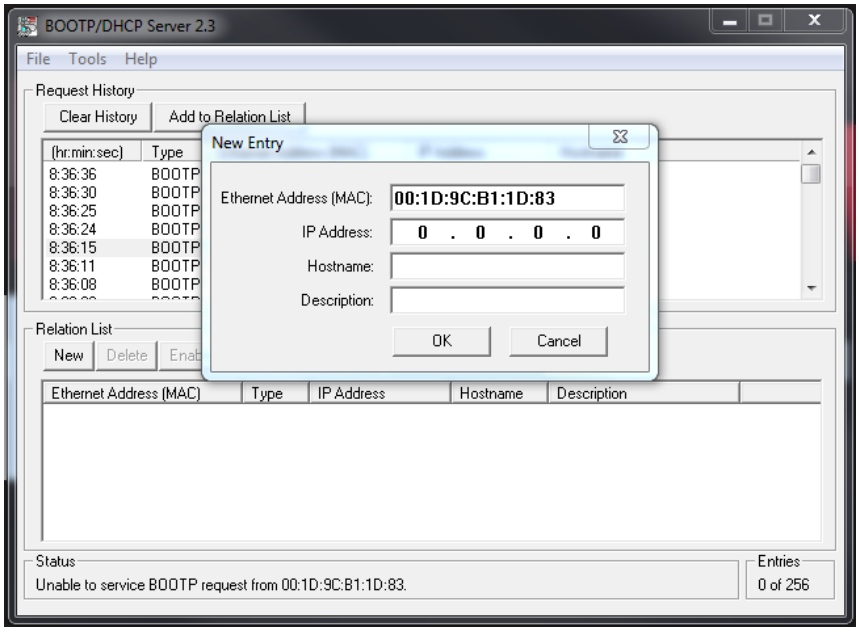
   The adapter immediately begins broadcasting its BOOTP message which indicates it is available to have its address set. If the adapter does not broadcast its BOOTP message, refer to the Change an Assigned IP Address or Enable BOOTP in the 2100-ENET Adapter section.



4. In the Request History area, double-click the desired node.

   The New Entry dialog box appears.

   Fill in the IP address, host, and description.



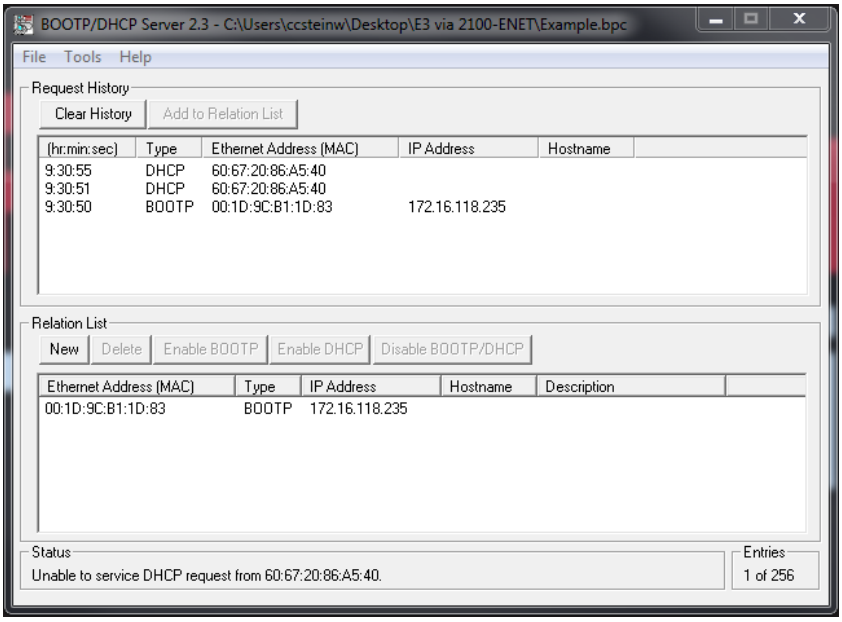
Fill in the IP address, host, and description.

TIP The IP address is the only required information.

5. Click OK.
6. Cycle power to the 2100-ENET adapter.

   The newly assigned IP address appears in the Request History window.

TIP The end device's DeviceNet address is configured for node 63 by following the instructions provided in the appropriate end device user manual. The data rate is configured for 500 Kpbs by following the instructions provided in the appropriate end device user manual.



7. In the Relation List window, select the node and click Disable BOOTP/DHCP.

   This disables the BOOTP/DHCP functionality in the 2100-ENET adapter, permanently assigning the applied IP address.

8. To save the configuration data, from the File menu, choose Save As and provide an appropriate filename.

   TIP This information is useful for future configuration changes that use the BOOTP server program.

9. Cycle power to the 2100-ENET adapter.

   Upon powerup, the 2100-ENET adapter disables the BOOTP protocol and responds to network traffic that is addressed to the assigned IP address every time it powers up.

Change an Assigned IP Address or Enable BOOTP in the 2100-ENET Adapter

1. Connect your personal computer to the network to which the 2100-ENET adapter is connected.

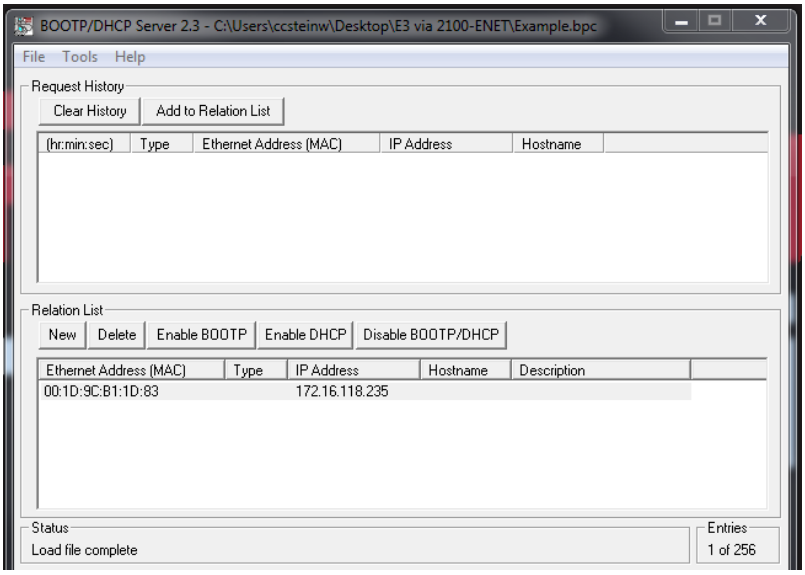
   The adapter can be connected directly to your personal computer, if a network does not exist.

Do not apply power to the 2100-ENET adapter until directed to do so.

2. Start your BOOTP program.

3. Apply power to the 2100-ENET adapter.
4. From the File menu, choose Open.
5. Select your saved configuration data file and click OK.

   The node configuration appears in the Relation List window.



6. To change the IP address or enable BOOTP, right-click the node and choose Properties.
7. Cycle power to the 2100-ENET adapter.

   The selected action takes effect upon powerup.

   If the configuration file does not exist, click New in the Relation List window and enter the Ethernet Address (MAC) printed on the product data nameplate, along with the previously assigned IP address to add the unit to the Relation List. Further actions described above can then be executed on the desired unit.

Set the Data Rate

By default, the adapter is set to autodetect, so it automatically detects the data rate and duplex setting used on the network.

TIP The end device's DeviceNet address is configured for node 63 by following the instructions provided in the appropriate end device user manual. The data rate is configured for 500 Kpbs by following the instructions provided in the appropriate end device user manual.

Set the I/O Configuration

The I/O configuration determines the data that is sent to and from the E3 Plus or 825-P. Both the E3 Plus and the 825-P use Input and Output Assemblies to determine the data being sent. See Table 1 on page 42 for a list of input and output assemblies supported by the Add-on Profile (AOP). For instructions on how to change the input and output assemblies of the E3 Plus or 825-P, refer to the appropriate user manual.

Set a Fault Action

By default, when I/O communication is disrupted (for example, a cable is disconnected) or the controller is idle (in Program mode or faulted), the end device responds by faulting, if it is using I/O from the network. You can configure a different response to a communication fault or an idle controller in the end device. For instructions on how to change the fault or idle actions, refer to the appropriate user manual.

ATTENTION: Risk of injury or equipment damage exists. Various parameters in the end device let you determine the action of the adapter and the end device if I/O communication is disrupted or the controller is idle. By default, these parameters turn off the outputs of the end device. You can set these parameters so that the outputs react as desired (for example, to keep the motor running). Take precautions to be sure that the settings of these parameters do not create a risk of injury or equipment damage. When commissioning the end device, verify that your system responds correctly to various situations (for example, a disconnected cable or faulted controller).

Reset the Adapter

Changes to some of the parameters in the E3 Plus or 825-P (for example, input and output assemblies) require that the adapter is reset before the new settings take effect. You can reset the adapter by power cycling the 2100-ENET adapter or by clicking Reset Module in the E3 Plus or 825-P AOP.

ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting control I/O to the end device, the end device can fault when you reset the adapter. Determine how your end device responds before resetting a connected adapter.

When a Reset Module is issued, the 2100-ENET adapter immediately resets. When this occurs, the E3 Plus or 825-P does not reset.

Update the Adapter

The adapter can be updated over the network. ControlFLASH™ software, a tool provided by Allen-Bradley, is used for updating the adapter.

To obtain a update for this adapter, go to http://www.rockwellautomation.com/rockwellautomation/support. This site contains all firmware update files and associated Release Notes that describe firmware update enhancements/anomalies, how to determine the existing firmware revision, and how to update by using ControlFLASH software.

Update the E3 Plus or 825-P

The E3 Plus or 825-P can be updated while connected to the adapter. ControlFLASH software is used to update the E3 Plus or 825-P. There is a specific update file for the E3 Plus or 825-P when updating is done while still being connected to the adapter. The file has 'via_2100-ENET' in the title (that is, E3_Plus_via_2100-ENET.msi).

To obtain the update for this adapter, go to http://www.rockwellautomation.com/rockwellautomation/support.

Configure the I/O

This chapter provides instructions on how to configure a ControlLogix, PLC-5, SLC 500, or MicroLogix 1100 or MicroLogix 1400 controller to communicate with the adapter and end device.

Use RSLinx Classic Software

RSLinx Classic software, in all its variations (for example, Lite, Gateway, and OEM), is used to provide a communication link between the computer, network, and controller. RSLinx Classic software requires its network-specific driver to be configured before communication is established with network devices. Follow these steps to configure the RSLinx driver:

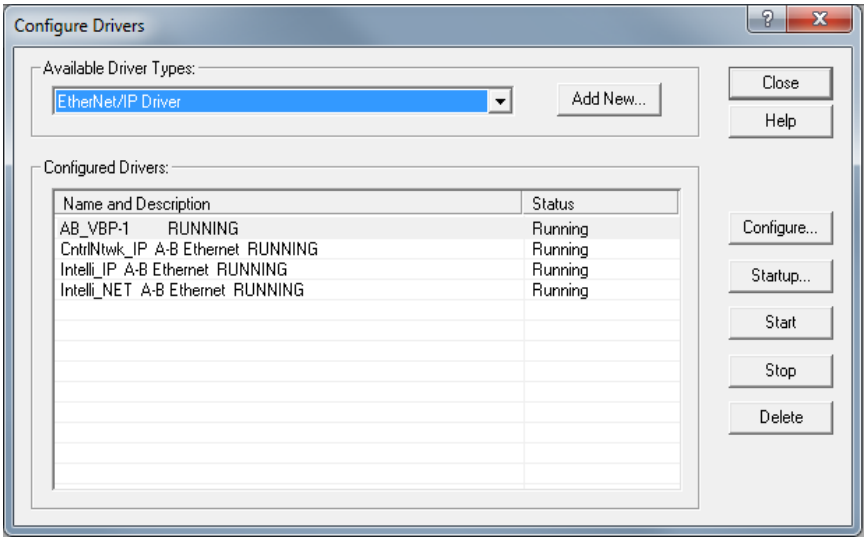
1. Start RSLinx software.
2. From the Communications menu, choose Configure Drivers.

   The Configure Drivers dialog log appears.
3. From the Available Drive Type pull-down menu, choose EtherNet/IP Driver.
4. Click Add New.

   The Add New RSLinx Driver dialog box appears.
5. Use the default name or type a new name and click OK.

   The ‘Configure driver:’ dialog box appears.
6. Depending on your application, select either the browse local or remote subnet option, and click OK.

   The Configure Drivers dialog box reappears with the new driver in the Configured Drivers list.



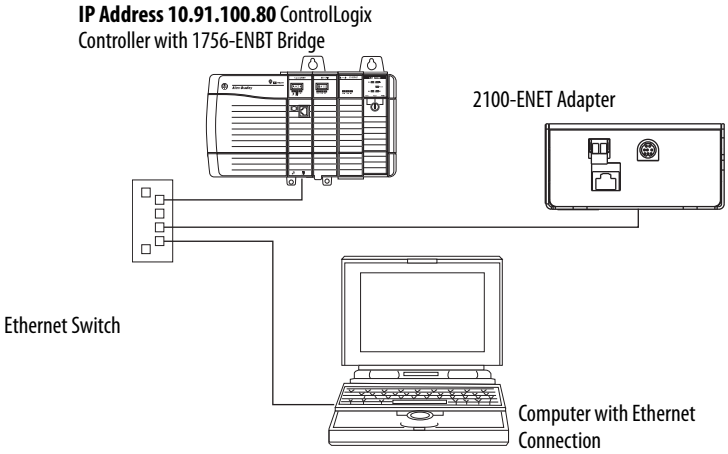
7. Click Close and keep RSLinx software running.
8. Verify that your computer recognizes the end device.
9. From the Communications menu, choose RSWho.
10. Click the '+' symbol next to the Ethernet driver.

    Note that two other RSLinx drivers (Ethernet devices or Remote Devices via Linx Gateway) can be used. Use one of these drivers if the EtherNet/IP network driver cannot see your end device.

ControlLogix Example

After the adapter is configured, the end device and adapter is a single node on the network. This section provides the steps needed to configure a simple EtherNet/IP network (see Figure 3). In our example, we configure a ControlLogix controller with 1756-ENBT (Series A) bridge to communicate with the end device, by using the Input and Output Assemblies over the network.

Figure 3: Example ControlLogix EtherNet/IP Network

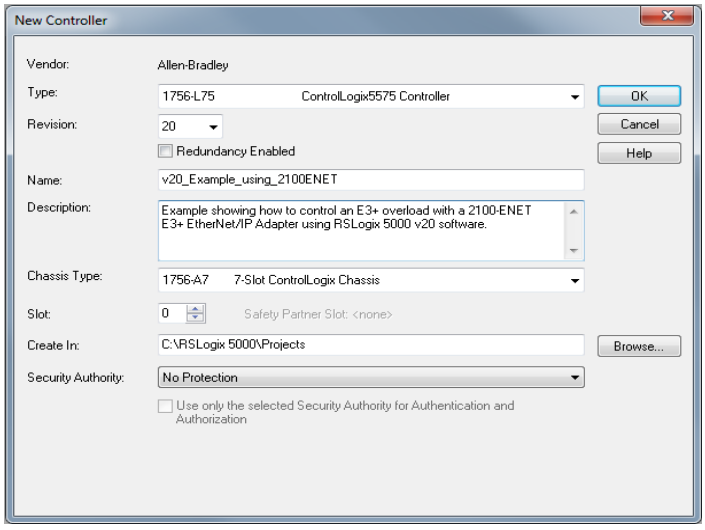


Add the Bridge to the I/O Configuration

To establish communication between the controller and adapter over the network, you must first add the ControlLogix controller and its bridge to the I/O configuration. This procedure is similar for all RSLogix 5000 software versions.

1. Start RSLogix 5000 software.
2. From the File menu, choose New.

   The New Controller dialog box appears. (RSLogix 5000 software, version 20, is shown.)



   Make the appropriate choices for the fields on the dialog box to match your application and click OK.

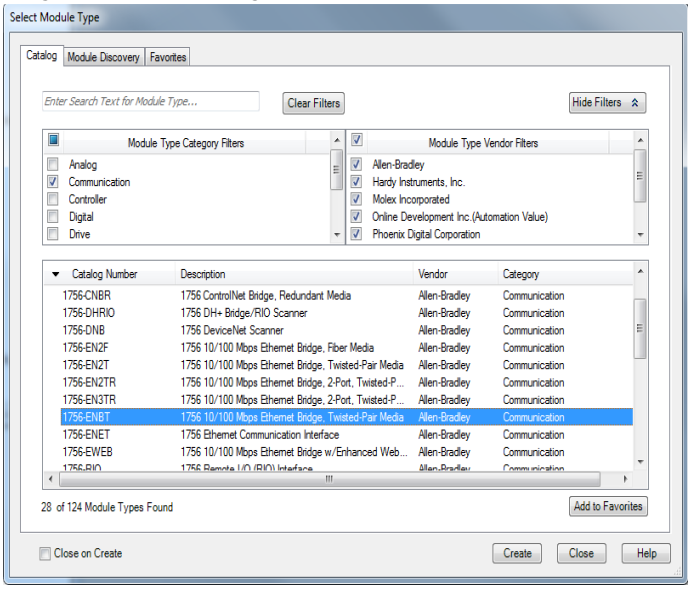
The RSLogix 5000 window reappears with the treeview in the left pane.

3. In the treeview, right-click the I/O Configuration folder and choose New Module.

   The Select Module dialog box appears.

4. Expand the Communications group to display all of the available communication modules.

Bridge Select Module Dialog Box



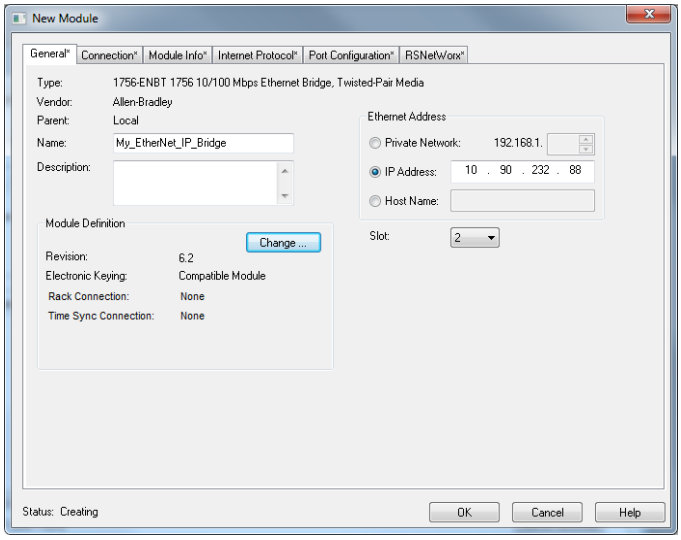
5. From the list, select the EtherNet/IP network bridge used by your controller and click Create.

   In this example, we use a 1756-ENBT EtherNet/IP network Bridge (Series A).

6. From the Select Major Revision dialog box, select the major revision of its firmware and click OK.

7. Click OK.

The bridge's New Module dialog box appears.

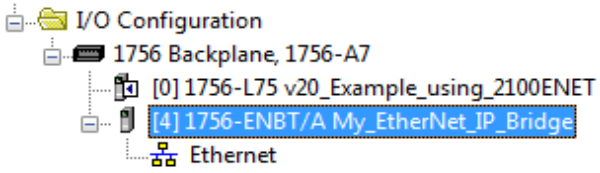


8. Edit the following.

Box	Setting
Name	A name to identify the EtherNet/IP network bridge.
Description	Optional – description of the EtherNet/IP network bridge.
IP Address	The IP address of the EtherNet/IP network bridge.
Host Name	Not used.
Slot	The slot of the EtherNet/IP network bridge in the rack.
Revision	The minor revision of the firmware in the bridge. (You already set the major revision by selecting the bridge series in step 5.)
Electronic Keying	Compatible Keying. The Compatible Keying setting for Electronic Keying ensures the physical module is consistent with the software configuration before the controller and bridge make a connection. Therefore, verify that you have set the correct revision in this dialog box. Refer to the online Help for additional information on this and other Electronic Keying settings. If keying is not required, choose Disable Keying. Disable keying is recommended.
Open Module Properties	When this box is checked, additional module properties dialog box appears to further configure the bridge after clicking OK. When unchecked, the bridge's New Module dialog box closes after clicking OK. For this example, clear this box.

9. Click OK.

The bridge is now configured for the EtherNet/IP network and added to the RSLogix 5000 project. It appears in the I/O Configuration folder. In our example, a 1756-ENBT bridge appears under the I/O Configuration folder with its assigned name. For convenience, keep the project open. Later in this chapter, the project must be downloaded to the controller .



There are three ways to add the adapter into the I/O configuration:

- End device Add-on Profiles (RSLogix 5000 software, version 16 or later)
- Classic Profile (RSLogix 5000 software, version 15 only)
- Generic Profile (RSLogix 5000 software, all versions)

These are described in separate sections below. If your version of RSLogix 5000 software supports Add-on Profiles, we recommend using this method.

Using RSLogix 5000 End Device Add-on Profiles (version 16 or later)

When compared to using the RSLogix 5000 Classic Profile, version 15 only, or Generic Profile (all versions), the RSLogix 5000 Add-on Profiles provide these advantages:

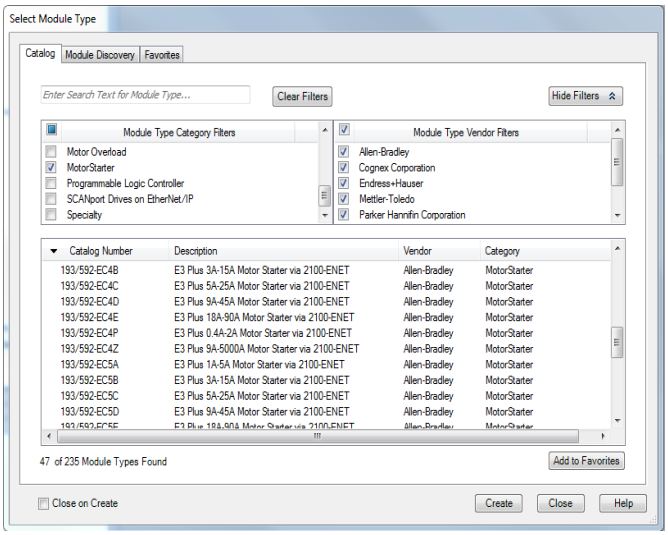
- Profiles for specific E3 Plus or 825-P that provide descriptive controller tags for the Input and Output Assembly. These profiles virtually eliminate I/O mismatch errors and substantially reduce configuration time.
- Unicast connection, version 18 or later.

Add the End Device/Adapter to the I/O Configuration

To transmit data between the bridge and the end device, you must add the end device as a child device to the parent bridge. In this example, RSLogix 5000 software, version 20, is used with Add-on Profile, version 1.01.

1. In the treeview, right-click the bridge and choose New Module.

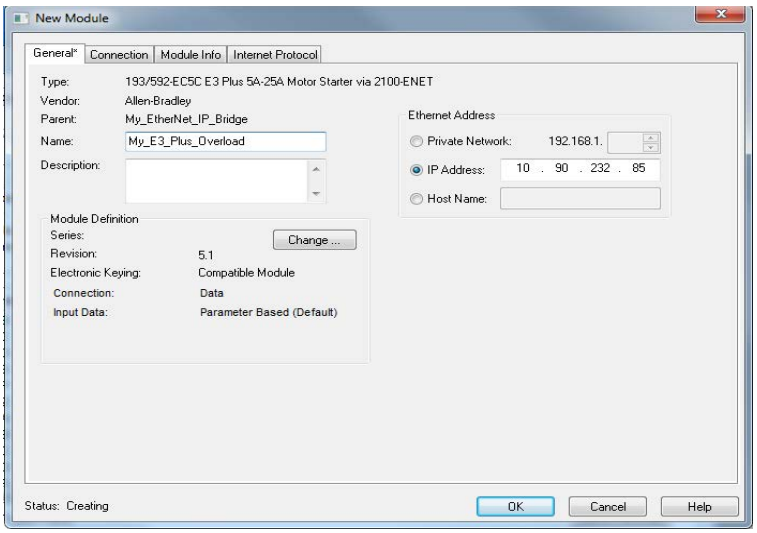
   The Select Module screen appears. In our example, we right-click the 1756-ENBT bridge. Expand the Other group to display all of the available drives with their communication adapters.



TIP If the End Device is not shown, go to http://www.rockwellautomation.com/rockwellautomation/support.

2. From the dialog box listing, select the end device and its connected adapter, and click Create.

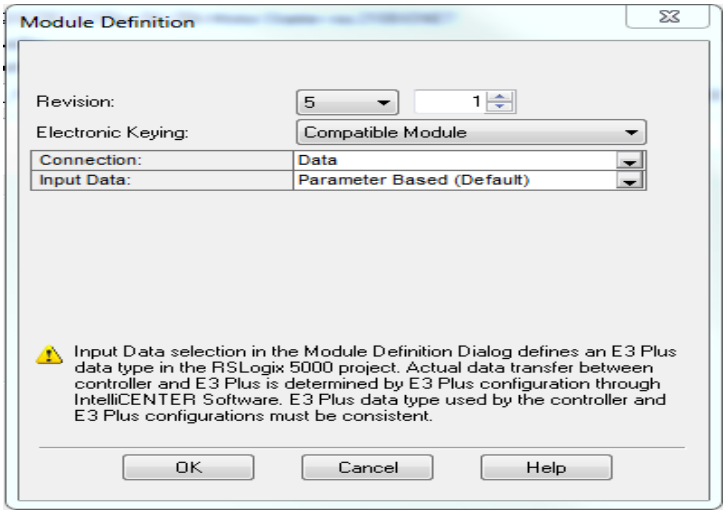
   The end device New Module dialog box appears.



3. On the General tab, edit the following data about the end device/adapter.

Box	Setting
Name	A name to identify the end device.
Description	Optional – description of the end device/adapter.
IP Address	The IP address of the adapter.

4. On the New Module dialog box in the Module Definition section, click Change to launch the Module Definition dialog box and begin the configuration process.



TIP To get the latest RSLogix 5000 Add-on Profile, go to http://www.rockwellautomation.com/rockwellautomation/support.

5. In the Module Definition dialog box, edit the following information.

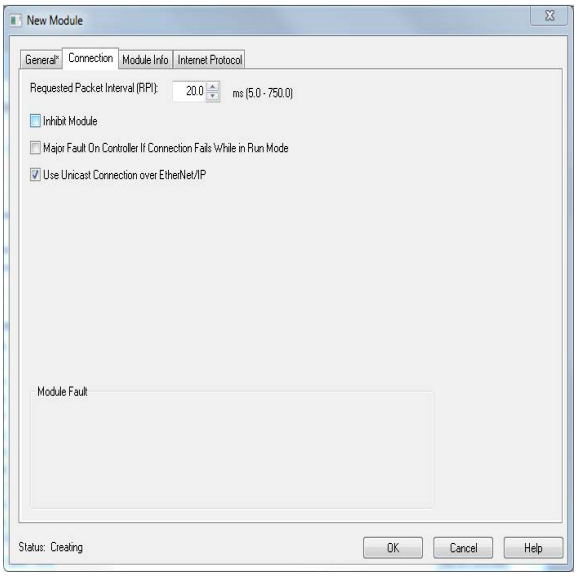
Box	Setting
Revision	The major and minor revision of the firmware (database) in the end device.
Electronic Keying	**Compatible Module**. The Compatible Module setting for Electronic Keying ensures the physical module is consistent with the software configuration before the controller and bridge make a connection. Therefore, verify that you have set the correct revision in this dialog box. Refer to the online Help for additional information on this and other Electronic Keying settings.
Connection	**Data**. This is the only type of connection supported by the adapter and is the only option in the Connection pull down menu.
Input Data	There are 4 Input Data options in the pull down menu. • Use Default when the default values are configured in the Input and Output Assembly as well as the default parameters are set in the Produced Assembly Words. • Use Parameter Based when the default values are NOT set in Input and Output Assembly. Also use Parameter Based if the default values are set in the Input and Output Assembly but the default values are NOT set in the Produced Assembly Words. • Use DeviceLogix™ software + Status when the DeviceLogix Output Assembly and Status Input Assembly are used. • Use Parameter Data Link when the parameter data link Input and Output Assemblies are used.

TIP When you change the Input Data, the Input and Output Assemblies are **not** changed in the end device and must be changed to the correct values to support the selected Input Data.

6. Click OK on the Module Definition dialog box to save the adapter configuration and close the dialog box.

   The end device's New Module dialog box reappears.

7. On the New Module dialog box, click the Connection tab.



8. In the Requested Packet Interval (RPI) box, set the value to 5.0 ms or greater.

   This value determines the maximum interval that a controller uses to move data to and from the adapter. To conserve bandwidth, use higher values for communicating with low priority devices.

The Inhibit Module box, when checked, inhibits the module from communicating with the RSLogix 5000 project. When the Major Fault on box is checked, a major controller fault occurs when the module's connection fails while the controller is in the Run mode. For this example, leave the Inhibit Module and Major Fault On boxes unchecked.

Unicast support has been added to RSLogix 5000 software, version 18. However, to also support unicast, the controller firmware must be (version 18 or later). Unicast is recommended whenever possible. For the benefits of unicast operation, see Prepare for an Installation on page 13.

9. Click Set to save the Port Configuration information, which sets the corresponding offline Subnet Cfg x and Gateway Cfg x parameters in the adapter.
10. Click OK on the New Module dialog box.

    The new node (for this example, My_E3_Plus_Overload) now appears under the bridge (for this example, My_EtherNet_IP_Bridge) in the I/O Configuration folder. If you double-click the Controller Tags, notice that module-defined data types and tags have been automatically created, and all tag names are defined. After you save and download the configuration, these tags let you to access the Input and Output data of the end device via the controller's ladder logic.

Controller Tags

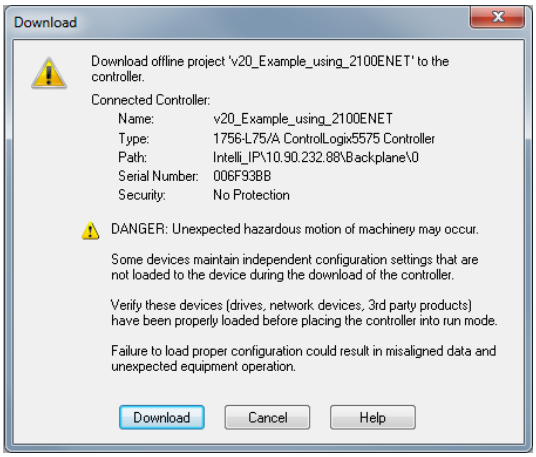
Name	Value	Force Mask	Style	Data Type
My_E3_Plus_Overload:I	{...}	{...}		AB:E3PlusEC5_P...
My_E3_Plus_Overload:I.TripPresent	0		Decimal	BOOL
My_E3_Plus_Overload:I.WarningPresent	0		Decimal	BOOL
My_E3_Plus_Overload:I.OutputA	0		Decimal	BOOL
My_E3_Plus_Overload:I.OutputB	0		Decimal	BOOL
My_E3_Plus_Overload:I.Input1	0		Decimal	BOOL
My_E3_Plus_Overload:I.Input2	0		Decimal	BOOL
My_E3_Plus_Overload:I.Input3	0		Decimal	BOOL
My_E3_Plus_Overload:I.Input4	0		Decimal	BOOL
My_E3_Plus_Overload:I.MotorCurrentPresent	0		Decimal	BOOL
My_E3_Plus_Overload:I.GroundFaultCurrentPresent	0		Decimal	BOOL
My_E3_Plus_Overload:I.Input5	0		Decimal	BOOL
My_E3_Plus_Overload:I.Input6	0		Decimal	BOOL
My_E3_Plus_Overload:I.MotorVoltagePresent	0		Decimal	BOOL
My_E3_Plus_Overload:I.L1Current	0		Decimal	INT
My_E3_Plus_Overload:I.L2Current	0		Decimal	INT
My_E3_Plus_Overload:I.L3Current	0		Decimal	INT
My_E3_Plus_Overload:O	{...}	{...}		AB:E3PlusEC5_P...
My_E3_Plus_Overload:O.OutputAData	0		Decimal	BOOL
My_E3_Plus_Overload:O.OutputBData	0		Decimal	BOOL
My_E3_Plus_Overload:O.ResetTrip	0		Decimal	BOOL
My_E3_Plus_Overload:O.UserTrip	0		Decimal	BOOL

Save the I/O Configuration to the Controller

After adding the bridge and drive/adapter to the I/O configuration, you must download the configuration to the controller. Also save the configuration to a file on your computer.

1. In RSLogix 5000 software, from the Communications menu, choose Download.

   The Download dialog box appears.



TIP If a message box reports that RSLogix 5000 software is unable to go online, from the Communications menu, choose Who Active to find your controller in the Who Active dialog box. After finding and selecting the controller, click Set Project Path to establish the path. If your controller does not appear, you need to add or configure the EtherNet/IP network driver in RSLinx software. Refer to the RSLinx online help.

2. Click Download to download the configuration to the controller.

   When the download is successfully completed, RSLogix 5000 software goes into the Online mode and the I/O Not Responding box in the upper-left of the window is flashing green. Also, a yellow warning symbol ⚠ is displayed on the I/O Configuration folder in the treeview and on the end device profile.

   If the controller was in Run mode before clicking Download, RSLogix 5000 software prompts you to change the controller mode back to Remote Run. In this case, choose the appropriate mode for your application. If the controller was in Program mode before clicking Download, this prompt does not appear.

3. From the File menu, choose Save.

   If this is the first time you saved the project, the Save As dialog box appears. Navigate to a folder, type a file name, and click Save to save the configuration to a file on your computer.

   To be sure that the present project configuration values are saved, RSLogix 5000 software prompts you to upload them. Click Yes to upload/save.

Using the RSLogix 5000 Generic Profile (all versions)

The basic RSLogix 5000 Generic Profile is recommended only when the following is true:

- A specific profile in other versions of RSLogix 5000 software is unavailable.
- Users are already familiar with a Generic Profile and do not want to convert an existing project to a Classic Profile, version 15, or a Add-on Profile, version 16 or later.
- A project must maintain specific revision level control.
- The controller cannot be taken offline. RSLogix 5000 software, version 16 or later, enables the Generic Profile to be added while the controller is online and in the Run mode.
- If the Input Data types do not support the Input and Output Assembly combination desired.

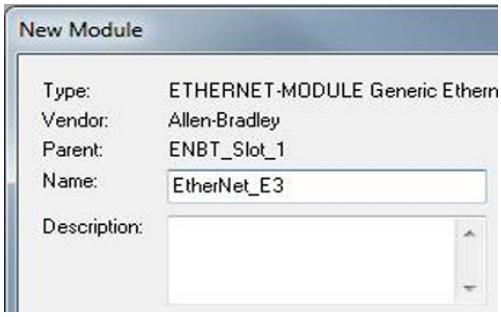
Logix Controller I/O Messaging

RSLogix 5000 software is used to configure I/O messaging between a Logix controller and an E3 Plus EtherNet/IP network adapter on an EtherNet/IP network. Follow these steps to configure a Logix controller for I/O messaging.

1. Right-click the EtherNet/IP network scanner in I/O Configuration and choose New Module to open the Select Module Type dialog box.
2. Select Generic Ethernet Module and click OK.
3. Enter a name for the E3 Plus EtherNet/IP network adapter.

   The name creates a tag in RSLogix 5000 software that can be used to read and write data from the E3 Plus EtherNet/IP network adapter.

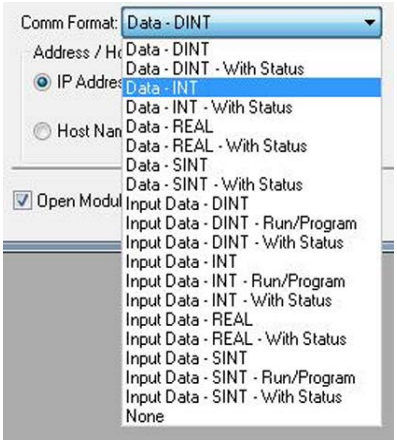
New Module: Select Module Type



4. Choose Data-INT for the Comm Format.

   The Comm Format tells RSLogix 5000 software the format of the data. The Data-INT format represents the data from the E3 Plus EtherNet/IP network adapter as a field of 16-bit values.

Comm Format Selections



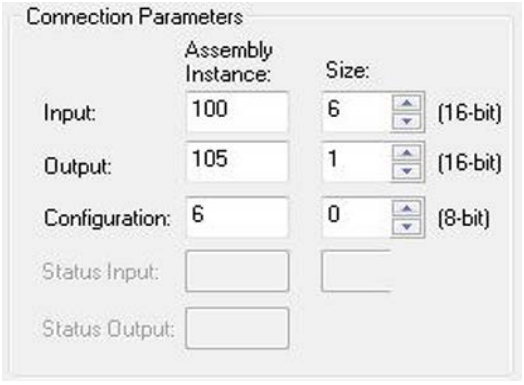
5. Set the Connection Parameters.

   Access I/O data by using Input Instance 100 and Output Instance 103 (for E3 standard) or 105 (for E3 Plus) by default.

IMPORTANT If you have already changed the Input and Output Assemblies, enter those values instead of the default values.

The size of the input connection and the output connection shall correspond to the size of the chosen instance. For Instance 100, the size is 6. For Instances 103 and 105, the size is 1. The E3 Plus EtherNet/IP network adapter Configuration Assembly Instance is 6. Currently, the 2100-ENET adapter does not support the configuration assembly.

Connection Parameters

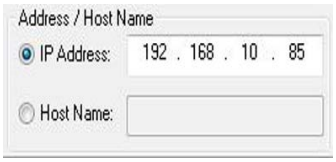


Bit	Contents
0	OutA
1	OutB
2	Fault Reset
3	Not Used
4	Not Used
5	Remote Reset
6	Not Used
7	Not Used

Byte Size	Contents
2 Bytes	Header information (Pad Word)
2 Bytes	Header information (Pad Word)
2 Bytes	Value of parameter pointed to by parameter #61
2 Bytes	Value of parameter pointed to by parameter #62
2 Bytes	Value of parameter pointed to by parameter #63
2 Bytes	Value of parameter pointed to by parameter #64

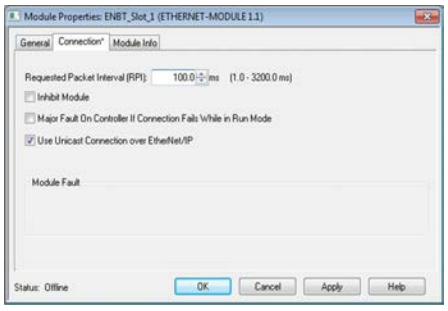
6. Enter the IP address of the E3 Plus EtherNet/IP network adapter.

IP Address

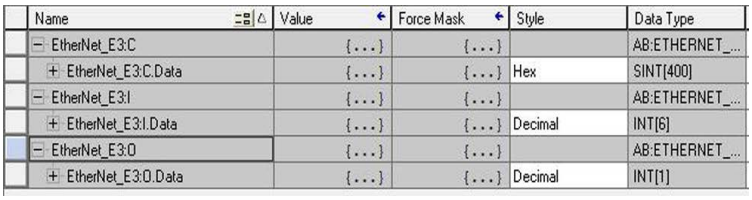


7. Click Next.
8. Enter a value for the time between each scan of the adapter.
9. Make sure Inhibit Module is not checked.

Module Properties



10. Click Finish to add the E3 Plus EtherNet/IP network adapter to the I/O Configuration in RSLogix 5000 software.



Name	Value	Force Mask	Style	Data Type
EtherNet_E3:C	{...}	{...}		AB:ETHERNET_...
EtherNet_E3:C.Data	{...}	{...}	Hex	SINT[400]
EtherNet_E3:I	{...}	{...}		AB:ETHERNET_...
EtherNet_E3:I.Data	{...}	{...}	Decimal	INT[6]
EtherNet_E3:O	{...}	{...}		AB:ETHERNET_...
EtherNet_E3:O.Data	{...}	{...}	Decimal	INT[1]

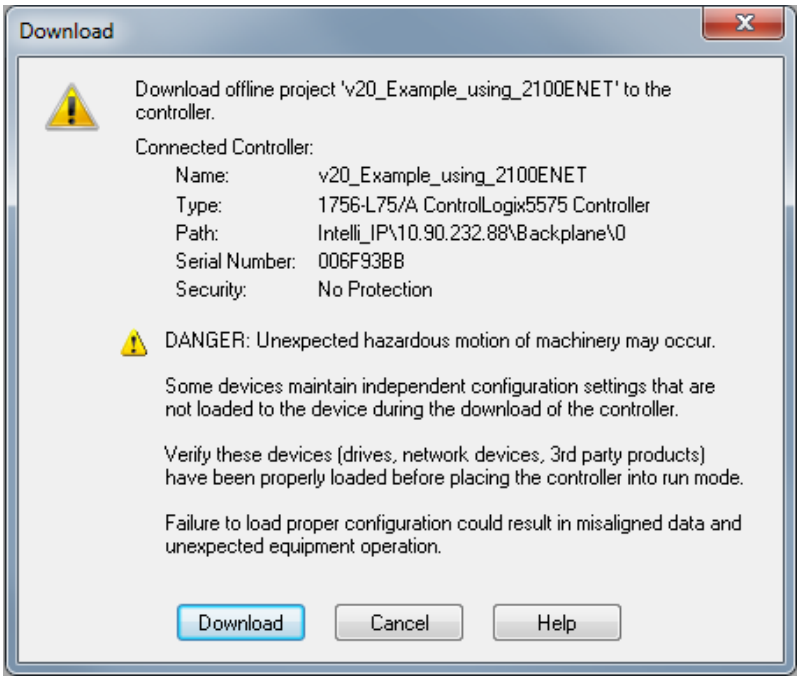
Save the I/O Configuration to the Controller

After adding the bridge and the end device to the I/O configuration, you must download the configuration to the controller. Also save the configuration to a file on your computer.

TIP When using RSLogix 5000 software, version 16 or later, you can add the I/O configuration of a Generic Profile while the controller is online and in the Run mode.

1. In the RSLogix 5000 window, from the Communications menu, choose Download.

   The Download dialog box appears.



TIP If a message box reports that RSLogix 5000 software is unable to go online, from the Communications menu, choose Who Active to find your controller in the Who Active dialog box. After finding and selecting the controller, click Set Project Path to establish the path. If your controller does not appear, you need to add or configure the EtherNet/IP network driver in RSLinx software. See Use RSLinx Classic Software on page 25 for details.

2. Click Download to download the configuration to the controller.

   When the download is successfully completed, RSLogix 5000 software goes into the Online mode and the I/O OK box in the upper-left of the dialog box is steady green.

3. From the File menu, choose Save.

   If this is the first time you saved the project, the Save As dialog box appears. Navigate to a folder, type a file name, and click Save to save the configuration to a file on your computer.

   To be sure that the present project configuration values are saved, RSLogix 5000 software prompts you to upload them. Click Yes to upload/save.

4. Place the controller in Remote Run or Run mode.

Limitations When Using PLC-5, SLC 500, or MicroLogix 1100 or MicroLogix 1400 Controllers

Controlling I/O with explicit messages is relatively complex compared to normal implicit I/O control.

ControlLogix and CompactLogix controllers with EtherNet/IP network provide the easiest and most integrated form of implicit I/O control for an E3 Plus or 825-P module. Programming software RSLogix 5000 software, version 16 or later, for ControlLogix and CompactLogix controllers contains E3 Plus or 825-P module Add-on Profiles that, with a few clicks of the mouse, automatically create all controller tags and an implicit connection at the specified Requested Packet Interval to control the end device. This connection is monitored at both ends to be sure that the controller and end device are communicating. A watchdog causes the end device to fault if the end device does not respond within approximately 100 milliseconds. Therefore, using a ControlLogix or CompactLogix controller is the preferred method of controlling the end device on EtherNet/IP network.

If you are not using either of these type of controllers, then the E3 Plus or 825-P module on EtherNet/IP network can be controlled with explicit messages by using PLC-5, SLC 500, or MicroLogix 1100 or MicroLogix 1400 controllers with the following limitations:

- An explicit message is a much slower form of control and is non-deterministic. This means that you cannot guarantee how long the end device takes to turn an output on or off when the command is given. Therefore, subject all equipment used in this manner to a risk assessment, taking into account the mechanical and electrical implementation.
- A timeout value (in seconds) in the adapter issues a fault on the end device if a message is not received from the controller within the specified time. However, the controller has no way of detecting a loss of communication to the end device until the next cycle of explicit messages. This is another factor in the risk assessment.
- Any additional end devices to be controlled requires additional explicit messages for their control, and they need to be carefully sequenced. Most controllers have small communication queues (refer to its user manual), which need to be carefully managed if messages are not to be lost.

- Each controller has a limited number of communication connections (refer to its user manual for maximum connections), which limits the number of end devices that can be connected.

In summary, unlike a ControlLogix or CompactLogix controller, programming a PLC-5, SLC 500, or MicroLogix 1100 or MicroLogix 1400 controller by using RSLogix 5 or RSLogix 500 software with explicit messages is more difficult, and produces a more complex program.

Using the I/O

This chapter provides information and examples that explain how to control, configure, and monitor an E3 Plus module by using the configured I/O.

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

About I/O Messaging

On CIP-based networks, including EtherNet/IP network, I/O connections are used to transfer the data that controls the E3 Plus module. I/O can also be used to transfer data to and from E3 Plus modules.

Chapter 3 and Chapter 4 discuss how to configure the adapter and controller on the network for these options. The Glossary defines the different options. This chapter discusses how to use I/O after you have configured the adapter and controller.

Understanding the I/O Image

The terms **input** and **output** are defined from the controller's point of view. Therefore, output I/O is data that is produced by the controller and consumed by the E3 Plus module. Input I/O is status data that is produced by the E3 Plus module and consumed as input by the controller. The I/O image varies based on the following:

- Configuration of the Input and Output Assemblies in the E3 Plus. For more information on this, see E3 and E3 Plus Solid-State Overload Relay User Manual, publication 193-UM002.
- **ControlLogix/CompactLogix Controllers only**—The E3 Plus module profile used in RSLogix 5000 software (E3 Plus module Add-on Profile in version 16 or later, Classic Profile in version 15, or Generic Profile in all versions).

ControlLogix Controller Image

In all instances of the E3 Plus Add-on Profile, the controller tags are predefined in Table 1. In RSLogix 5000 software, version 16 or later, and the Classic Profile for version 15, these controller tags are automatically created for you. However, when using the Generic Profile (See Using the RSLogix 5000 Generic Profile (all versions) on page 35) in RSLogix 5000 software, these controller tags are not descriptive or defined.

The following tables show how to configure the E3 Plus based on the settings chosen in setting up the E3 Plus Add-on Profile in RSLogix 500 software. Table 1 shows how the Input and Output Assemblies are configured in the E3 Plus. Table 2 shows the general tag names for specific assemblies. These assemblies are not changed from those reflected in the E3 Plus user manual. For more detailed information on the tables below, reference E3 and E3 Plus Solid-State Overload Relay User Manual, publication 193-UM002.

Table 1: Input and Output Assembly Configuration for the E3 Plus per Connection Type

Connection		Output Assembly (59)	Input Assembly (60)
EC1 Connection			
	Parameter Based (Default)	103	100
	Parameter Based	103	100
	Status	103	106
	Parameter via DataLink	110	111
EC2, EC3, EC4 Connection			
	Parameter Based (Default)	105	100
	Parameter Based	105	100
	DeviceLogix + Status	140	141
	Parameter via DataLink	110	111
EC5 Connection			
	Parameter Based (Default)	105	100
	Parameter Based	105	100
	DeviceLogix + Status	140	142
	Parameter via DataLink	110	111

Table 2: Connection Tag Name

Input Assemblies	
Assembly 100 (Default E3 Plus settings)	
Word 0	Pad Word
Word 1	Pad Word
Word 2	Status
Word 3	L1 Current
Word 4	L2 Current
Word 5	L3 Current
Assembly 100 (Modified Parameter Settings)	
Word 0	Pad Word
Word 1	Pad Word
Word 2	Data in 61
Word 3	Data in 62
Word 4	Data in 63
Word 5	Data in 64
Assembly 106 (EC1 Only)	
Word 0	Pad Word
Word 1	Pad Word
Word 2	Status
Assembly 111	
Word 0	Pad Word
Word 1	Pad Word
Word 2	ParamANumber
Word 3	ParamAData
Word 4	ParamBNumber
Word 5	ParamBData
Assembly 141 (EC2, EC3, EC4)	
Word 0	Pad Word
Word 1	Pad Word
Word 2	Status
Word 3	RestOfNetworkOutputs
Assembly 142 (EC5 Only)	
Word 0	Pad Word
Word 1	Pad Word
Word 2	Status
Word 3	Network Outputs

Table 2: Connection Tag Name (continued)

Output Assemblies	
Assembly 103 (EC1 Only)	
Word 0	Command Word
Assembly 105 (All except EC1)	
Word 0	Command Word
Assembly 110	
Word 0	Command Word
Word 1	NetworkInputs
Word 2	StatusParameterA
Word 3	StatusParameterB
Assembly 140 (All except EC1)	
Word 0	Command Word
Word 1	RestOfNetworkInputs

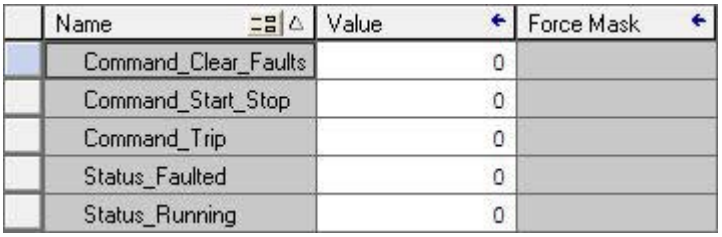
ControlLogix Example

In this ControlLogix example, we create ladder logic by using the RSLogix Add-on Profiles in several situations.

Create Ladder Logic by Using the RSLogix 5000 E3 Plus Module Add-E3 Plus on Profiles (version 16 or later)

For this example, a ControlLogix L75 controller energizes OutputA on an E3 Plus by using the E3 Plus Add-on Profile. The adapter is configured at address 10.90.232.85 on the EtherNet/IP network. Its Output Assembly is configured to use Assembly 105, and its Input Assembly is configured to use Assembly 100 (this uses the Parameter Based (Default) connection, see Table 2). The E3 Plus Add-on Profile automatically created descriptive controller tags for the entire I/O image that you can use to directly control and monitor the drive without creating any ladder logic program. However, if you intend to use Human Machine Interface devices (for example, PanelView™ terminal) to operate the drive and view its status, create descriptive user-defined Program tags and a ladder logic program that passes the Controller tag data to the Program tags.

Figure 4: ControlLogix Program Tags for an E3 Plus Add-on Profile Ladder Logic Program Example



The example ladder logic below can be used to toggle the E3 Plus Output A on and off with the descriptive tags created by the E3 Plus Add-on Profile. The prefix for the E3 Plus Controller tags is determined by the name assigned when configuring the
I/O.

Figure 5: ControlLogix Example Ladder Logic Program Using an E3 Plus Add-on Profile for Inputs

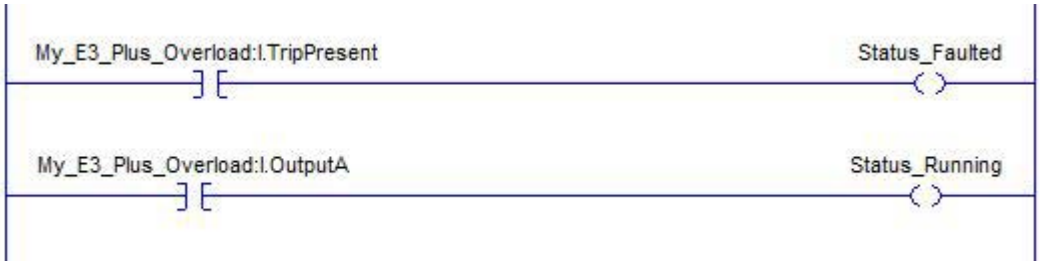


Figure 6: ControlLogix Example Ladder Logic Program Using an E3 Plus Add-on Profile for Outputs

Create Ladder Logic by Using the RSLogix 5000 Classic Profile (versions 13…15)

Because the RSLogix 5000 Classic Profile has been significantly improved upon by RSLogix 5000 drive Add-on Profiles, version 16 or later, it is highly recommended to use RSLogix 5000 E3 Plus module Add-on Profiles to take advantage of its benefits (more intuitive, time saving, and less likely to make ladder logic program errors).

Create Ladder Logic by Using the RSLogix 5000 Generic Profile (all versions)

When you add the adapter and E3 Plus module to the I/O configuration (Chapter 4), RSLogix 5000 software automatically creates generic (non-descriptive) controller tags for them. In this example program, the following controller tags are used.

Figure 7: ControlLogix Controller Tags for E3 Plus Module Generic Profile Example Ladder Logic Program

Name	Value	Force Mask
+ My_E3_Plus_Overload:C	{...}	{...}
− My_E3_Plus_Overload:I	{...}	{...}
− My_E3_Plus_Overload:I.Data	{...}	{...}
+ My_E3_Plus_Overload:I.Data[0]	0	
+ My_E3_Plus_Overload:I.Data[1]	0	
+ My_E3_Plus_Overload:I.Data[2]	0	
+ My_E3_Plus_Overload:I.Data[3]	0	
+ My_E3_Plus_Overload:I.Data[4]	0	
+ My_E3_Plus_Overload:I.Data[5]	0	
− My_E3_Plus_Overload:O	{...}	{...}
− My_E3_Plus_Overload:O.Data	{...}	{...}
+ My_E3_Plus_Overload:O.Data[0]	0	

You can expand the Input and Output tags to reveal the input and output configuration.

Figure 8: ControlLogix Input Image for Generic Profile Example Ladder Logic Program

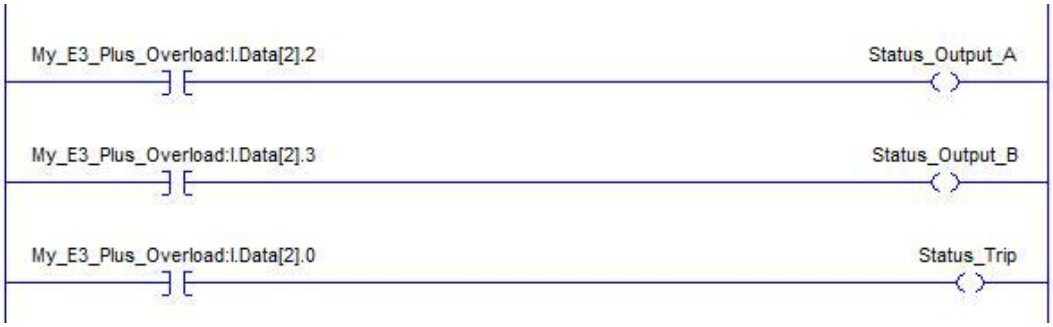
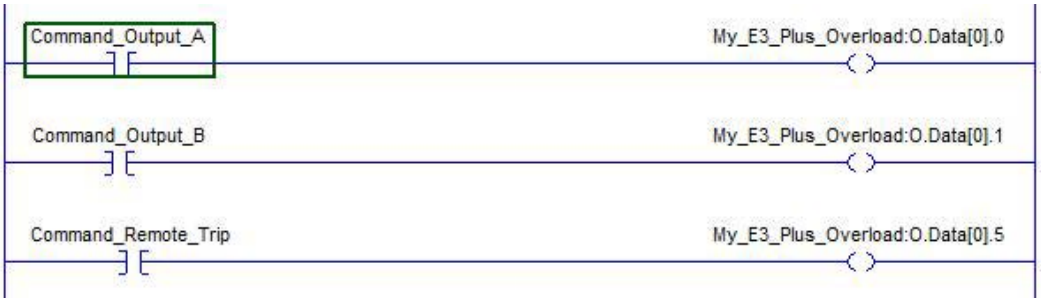


Figure 9: ControlLogix Output Image for Generic Profile Example Ladder Logic Program



Using Explicit Messaging

This chapter provides information and examples that explain how to use Explicit Messaging to configure and monitor the connected device.

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

ATTENTION: Risk of equipment damage exists. If Explicit Messages are programmed to write parameter data to nonvolatile storage (NVS) frequently, the NVS quickly exceeds its life cycle and causes the E3 Plus module to malfunction. Do not create a program that frequently uses Explicit Messages to write parameter data to NVS.

About Explicit Messaging

Explicit Messaging is used to transfer data that does not require continuous updates. With Explicit Messaging, you can configure and monitor a slave device's parameters on the network.

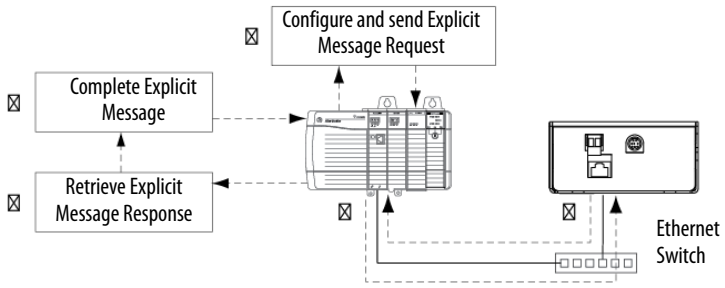
IMPORTANT When an explicit message is performed, by default no connection is made because it is an unconnected message. When timing of the message transaction is important, you can create a dedicated message connection between the controller and the end device by checking the Connected box on the Communications tab message configuration dialog box during message setup. These message connections are in addition to the I/O connection. However, the trade off for more message connections is decreased network performance. If your application cannot tolerate this, do not check the Connected box, which is recommended.

Performing Explicit Messages

There are five basic events in the Explicit Messaging process. The details of each step varies depending on the type of controller being used. Refer to the documentation for your controller.

IMPORTANT There must be a request message and a response message for all Explicit Messages, whether you are reading or writing data.

Figure 10: Explicit Message Process



Explicit Message Descriptions

- You format the required data and configure the ladder logic program to send an Explicit Message request to the scanner or bridge module (download).
- The scanner or bridge module transmits the Explicit Message Request to the slave device over the network.
- The slave device transmits the Explicit Message Response back to the scanner. The data is stored in the scanner buffer.
- The controller retrieves the Explicit Message Response from the scanner's buffer (upload).
- The Explicit Message is complete.

For information on the maximum number of Explicit Messages that can be executed at a time, refer to the user manual for the scanner or bridge and/or controller that is being used.

ControlLogix Examples

TIP To display the Message Configuration dialog box in RSLogix 5000 software, add a message instruction (MSG), create a new tag for the message (Properties: Base tag type, MESSAGE data type, controller scope), and click the ... button in the message instruction.

For supported classes, instances, and attributes, refer to the appropriate end device user manual.

Explicit Messaging by Using RSLogix 5000 Software (version 15 or later)

ControlLogix Example Ladder Logic Program to Read a Single Parameter

A Parameter Read message is used to read a single parameter. This read message example reads the value of parameter 003 - [L3 Current] in a E3 Plus module.

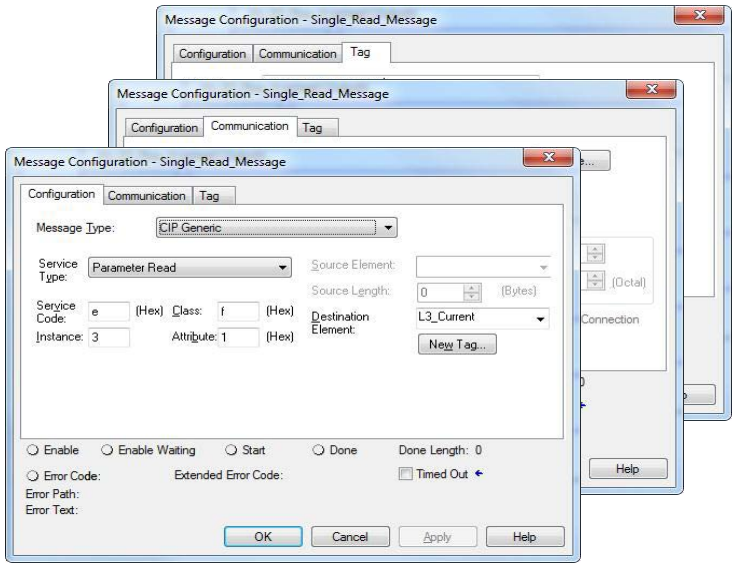
Table 3: Example Controller Tags to Read a Single Parameter

Operand	Controller Tags for Single Read Message	Data Type
XIC	Execute_Single_Read_Message	BOOL
MSG	Single_Read_Message	MESSAGE

Figure 11: Example Ladder Logic to Read a Single Parameter

ControlLogix Controller – Formatting a Message to Read a Single Parameter (version 15 or later)

Figure 12: Parameter Read Single Message Configuration Dialog Boxes



The following table identifies the data that is required in each box to configure a message to read a single parameter.

Table 4: Configure a Message to Read a Single Parameter

Configuration Tab	**Example Value**	**Description**
Message Type	CIP Generic	Used to access the Parameter Object in the adapter.
Service Type (1)	Parameter Read	This service is used to read a parameter value.
Service Code (1)	e (Hex.)	Code for the requested service.
Class	f (Hex.)	Class ID for the end device.
Instance	3 (Dec.)	Instance number is the same as parameter number.
Attribute	1 (Hex.)	Attribute number for the Parameter Value attribute.
Destination	L3 Current	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (2)	My_E3_Plus	The path is the route that the message follows.
Tag Tab	**Example Value**	**Description**
Name	Single_Read_Message	The name for the message.

(1) The default setting for Service Type is 'Custom,' enabling entry of a Service Code not available from the Service Type pull-down menu. When choosing a Service Type other than 'Custom' from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box, which is dimmed (unavailable).

(2) Click Browse to find the path, or type in the name of the device listed in the I/O Configuration folder.

ControlLogix Example Ladder Logic Program to Write a Single Parameter (version 15 or later)

A Parameter Write message is used to write to a single parameter. This write message example writes a value to parameter 28 - [FLA Setting] in an E3 Plus module.

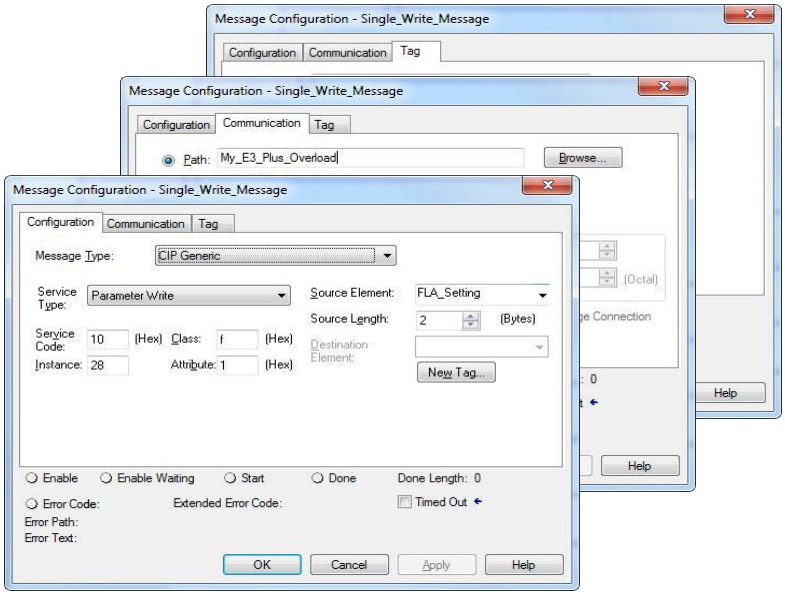
Table 5: Example Controller Tags to Write a Single Parameter

Operand	Controller Tags for Single Write Message	Data Type
XIC	Execute_Single_Write_Message	BOOL
MSG	Single_Write_Message	MESSAGE

Figure 13: Example Ladder Logic to Write a Single Parameter

ControlLogix Controller – Formatting a Message to Write a Single Parameter (version 15 or later)

Figure 14: Parameter Write Single Message Configuration Dialog Boxes



The following table identifies the data that is required in each box to configure a message to write a single parameter.

Table 6: Configure a Message to Write a Single Parameter

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the Parameter Object in the adapter.
Service Type (1)	Parameter Write	This service is used to write a parameter value.
Service Code (1)	10 (Hex.)	Code for the requested service.
Class	f (Hex.)	Class ID for the end device.
Instance	28 (Dec.)	Instance number is the same as parameter number.
Attribute	1 (Hex.)	Attribute number for the Parameter Value attribute.
Source Element	FLA Setting	Name of the tag for any service data to be sent from the scanner or bridge to the adapter/end device.
Source Length	2	Number of bytes of service data to be sent in the message.
Communication Tab	**Example Value**	**Description**
Path (2)	My_E3_Plus	The path is the route that the message follows.
Tag Tab	**Example Value**	**Description**
Name	Single_Write_Message	The name for the message.

(1) The default setting for Service Type is Custom, enabling entry of a Service Code not available from the Service Type pull-down menu. When choosing a Service Type other than Custom from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box, which is dimmed (unavailable).

(2) Click Browse to find the path, or type in the name of the device listed in the I/O Configuration folder.

ControlLogix Example Ladder Logic Program to Read a Group of Parameter by Using the E3 Status Object (not for 825-P)

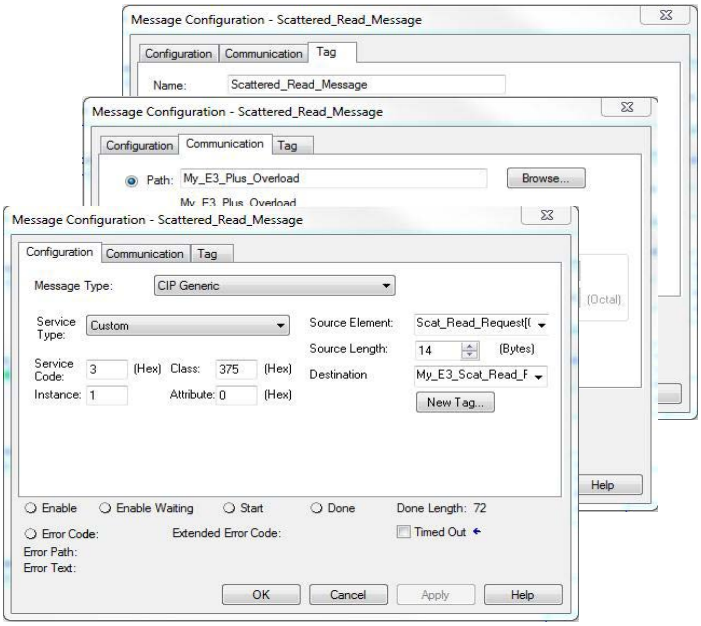
Table 7: Example Controller Tags to Read Multiple Parameters

Operand	Controller Tags for Read Multiple Message	Data Type
XIC	Execute_E3Status_Read_Message	BOOL
MSG	E3Status_Read_Message	MESSAGE

Figure 15: ControlLogix Example Ladder Logic Program to Read Multiple Parameters

ControlLogix Controller– Formatting a Message to Read a Group of Parameter Using the E3 Status Object (not for 825-P)

Figure 16: Scattered Read Message Configuration Dialog Boxes



The following table identifies the data that is required in each box to configure a message to read multiple parameters.

Configure a Message to Write a Single Parameter

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access Parameter Object in the adapter.
Service Type (1)	Custom	Required for E3 Status Object messages.
Service Code (1)	3 (Hex.)	Code for the requested service.
Class	375 (Hex.)	Class ID for the E3 Status Object.
Instance	1 (Dec.)	Required for E3 Status Object messages.
Attribute	0 (Hex.)	Required for E3 Status Object messages.
Source Element	E3Status_Read_Request	Name of the tag for any service data to be sent from scanner or bridge to the adapter/drive.
Source Length	14	Number of bytes of service data to be sent in the message.
Destination	E3Status_Read_Response	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (2)	My_E3_Plus	The path is the route that the message follows.
Tag Tab	**Example Value**	**Description**
Name	E3Status_Read_Message	The name for the message.

(1) The default setting for Service Type is Custom, enabling entry of a Service Code not available from the Service Type pull-down menu. When choosing a Service Type other than Custom from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box, which is dimmed (unavailable).

(2) Click Browse to find the path, or type in the name of the device listed in the I/O Configuration folder.

Figure 17: Creating ControlLogix Program Tags for Data Arrays Necessary for Multiple Read Messages

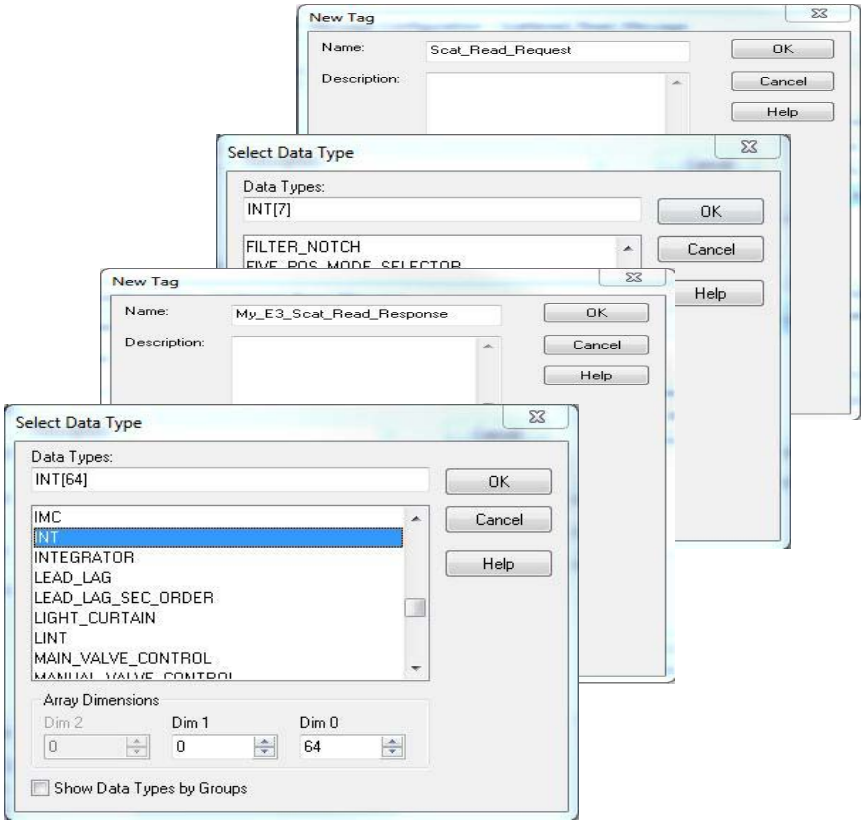
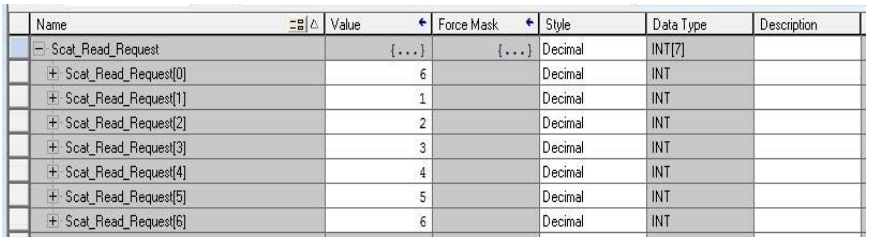


Figure 18: Resulting ControlLogix Program Tags for Data Arrays Necessary for Multiple Read Messages



Name	Value	Force Mask	Style	Data Type	Description
Scat_Read_Request	{...}	{...}	Decimal	INT[7]	
Scat_Read_Request[0]	6		Decimal	INT	
Scat_Read_Request[1]	1		Decimal	INT	
Scat_Read_Request[2]	2		Decimal	INT	
Scat_Read_Request[3]	3		Decimal	INT	
Scat_Read_Request[4]	4		Decimal	INT	
Scat_Read_Request[5]	5		Decimal	INT	
Scat_Read_Request[6]	6		Decimal	INT	

Name	Value	Force Mask	Style	Data Type	Description
My_E3_Scat_Read_Response	{...}	{...}	Decimal	INT[64]	
My_E3_Scat_Read_Response[0]	6		Decimal	INT	
My_E3_Scat_Read_Response[1]	1		Decimal	INT	
My_E3_Scat_Read_Response[2]	0		Decimal	INT	
My_E3_Scat_Read_Response[3]	0		Decimal	INT	
My_E3_Scat_Read_Response[4]	0		Decimal	INT	
My_E3_Scat_Read_Response[5]	0		Decimal	INT	
My_E3_Scat_Read_Response[6]	0		Decimal	INT	
My_E3_Scat_Read_Response[7]	0		Decimal	INT	
My_E3_Scat_Read_Response[8]	2		Decimal	INT	
My_E3_Scat_Read_Response[9]	0		Decimal	INT	
My_E3_Scat_Read_Response[10]	0		Decimal	INT	
My_E3_Scat_Read_Response[11]	0		Decimal	INT	
My_E3_Scat_Read_Response[12]	0		Decimal	INT	
My_E3_Scat_Read_Response[13]	0		Decimal	INT	
My_E3_Scat_Read_Response[14]	0		Decimal	INT	
My_E3_Scat_Read_Response[15]	3		Decimal	INT	
My_E3_Scat_Read_Response[16]	0		Decimal	INT	
My_E3_Scat_Read_Response[17]	9999		Decimal	INT	
My_E3_Scat_Read_Response[18]	9999		Decimal	INT	
My_E3_Scat_Read_Response[19]	0		Decimal	INT	
My_E3_Scat_Read_Response[20]	4		Decimal	INT	
My_E3_Scat_Read_Response[21]	0		Decimal	INT	
My_E3_Scat_Read_Response[22]	0		Decimal	INT	
My_E3_Scat_Read_Response[23]	0		Decimal	INT	
My_E3_Scat_Read_Response[24]	5		Decimal	INT	

Notes:

Troubleshooting

This chapter provides information for diagnosing and troubleshooting potential problems with the adapter and network.

Understanding the Status Indicators

The adapter uses four status indicators to report its operating status. See Figure 19.

Figure 19: Status Indicators

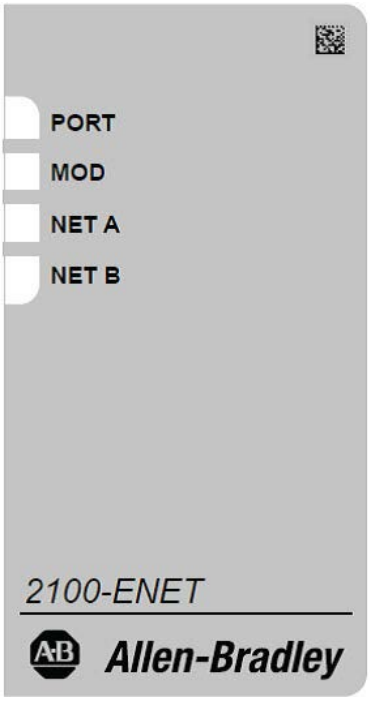


Table 8 - Status Indicators and Descriptions

Status Indicator	Description	Page
PORT	End Device Connection Status	58
MOD	Adapter Status	58
NET A	EtherNet/IP network Connection Status	59
NET B	EtherNet/IP network Transmit Status	59

PORT Status Indicator

This red/green bicolor status indicator indicates the status of the adapter's connection to the end device.

Status	Cause	Corrective Action
Off	The adapter is not powered or is not properly connected to the end device.	Securely connect the adapter to the end device by using the 2100-ENET adapter to DeviceNet cable. Verify there are 24V DC across the two terminals on the green connector.
Flashing Red	The adapter is not receiving a ping message from the end device.	Verify that cables are securely connected and not damaged. Replace cables if necessary. Cycle power to the end device and verify the end device powers up; for the E3 Plus module, there is a green flash and then a red flash on powerup.
Steady Red	The end device has refused an I/O connection from the adapter.	Important: Cycle power to the adapter after making any of the following corrections: Verify that the end device is supported by the adapter (that it is an E3 Plus or 825-P at the appropriate firmware revisions. See Getting Started on page 9).
Steady Orange	The adapter is connected to a product that is not supported.	Connect the adapter to a product that is supported by the adapter (for example, an E3 Plus or 825-P at the appropriate firmware revisions).
Flashing Green	The adapter is establishing an I/O connection to the end device.	No action required.
Steady Green	The adapter is properly connected and is communicating with the end device.	No action required.

MOD Status Indicator

This red/green bicolor status indicator indicates the status of the adapter.

Status	Cause	Corrective Action
Off	The adapter is not powered or is not properly connected to the end device.	• Securely connect the adapter to the end device by using the 2100-ENET adapter to DeviceNet cable. • Verify there are 24V DC across the two terminals on the green connector.
Flashing Red	The adapter has failed the firmware test. The adapter is being upgraded.	• Cycle power to the end device. • If cycling the power does not correct the problem, update the firmware to the latest firmware release.
Steady Red	The adapter has failed the hardware test.	• Cycle power to the adapter. • Replace the adapter.
Flashing Green	The adapter is operational, but is not transferring I/O data to a controller.	• Place the scanner in RUN mode. • Program the controller to recognize and transmit I/O to the adapter. • Configure the end device for the program in the controller.
Steady Green	The adapter is operational and transferring I/O data to a controller.	No action required.

NET A Status Indicator

This red/green bicolor status indicator indicates the status of the network connection.

Status	Cause	Corrective Actions
Off	The adapter is not powered, the adapter is not properly connected to the network, the adapter needs an IP address, or BOOTP is enabled.	• Securely connect the adapter to the end device by using the 2100-ENET adapter to DeviceNet cable and to the network by using an Ethernet cable. • Correctly connect the Ethernet cable to the Ethernet connector. • Set a unique IP address and disable BOOTP by using a BOOTP server. • Apply power to the adapter.
Steady Red	The adapter failed the duplicate IP address detection test.	Configure the adapter to use a unique IP address and cycle power.
Flashing Red	An EtherNet/IP network connection has timed out.	• Place the scanner in RUN mode. • Check the IGMP Snooping/Ethernet Switches for correct operation. • Check the amount of traffic on the network.
Flashing Red/Green	The adapter is performing a self-test.	No action required.
Flashing Green	The adapter is properly connected, has an IP address, and is connected to an EtherNet/IP network but does not have an I/O connection.	• Place the controller in RUN mode. • Program the controller to recognize and transmit I/O or make a messaging connection to the adapter. • Configure the end device for the program in the controller.
Steady Green	The adapter is properly connected and communicating on the network to a controller.	No action required.

NET B Status Indicator

This green status indicator indicates the status of the adapter transmitting on the network.

Status	Cause	Corrective Actions
Off	The adapter is not powered or is not transmitting on the network.	If NET A indicator is off, do the following: • Securely connect the adapter to the end device by using the 2100-ENET adapter to DeviceNet cable and to the network by using an Ethernet cable. • Correctly connect the Ethernet cable to the Ethernet connector. • Set a unique IP address by using a BOOTP server or by disabling BOOTP. If NET A indicator is steady red, do the following: • Configure the adapter to use a unique IP address and cycle power. • If NET A indicator is flashing red/green or red: • Check the IP address in the adapter and scanner, and verify that the controller can communicate with the adapter. • Ping the adapter. Normal condition if the adapter is idle.
Flashing Green	The adapter is properly connected, BOOTP is enabled, and the adapter is transmitting data packets on the network.	No action required.

Notes:

Specifications

Appendix A presents the specifications for the adapter.

Communication

Attribute	2100-ENET Adapter
Work	
Protocol	EtherNet/IP network
Data Rates, full-duplex	10 Mbps 100 Mbps
Data Rates, half duplex	10 Mbps 100 Mbps
Connection limits	30 TCP connections 16 simultaneous CIP connections, including 1 exclusive-owner I/O connection The following activities use a CIP connection: • Class I I/O connections (for example, from a ControlLogix controller) • Explicit messaging where connected is chosen (for example, in a checkbox in RSLogix 5000 software) • The following activities **do not** use a CIP connection: – Explicit messaging-based control by using PCCC or the Register or Assembly objects, including the PLC-5, SLC 500, and MicroLogix 1100 examples in Chapter 4 – Explicit messaging where connected is **not** chosen, which is typically the default 5 ms min
Requested packet interval (RPI) packet rate	Up to 400 total I/O packets per second (200 in and 200 out)
End Device	
Protocol	DeviceNet
Data Rates	500 Kbps (Autobaud feature also works)

Electrical

Attribute	2100-ENET Adapter
Consumption, end device	See the user manual for the end device
Consumption, 2100-ENET adapter	92 mA at 24V DC

Mechanical

Attribute	2100-ENET Adapter
Dimensions (HxLxW), approx	19 x 86 x 78.5 mm (0.75 x 3.39 x 3.09 in.)
Weight, approx	85 g (3 oz)

Environmental

Attribute	2100-ENET Adapter
Temperature, operating	-10…50 °C (14…122 °F)
Temperature, storage	-40…85 °C (-40…185 °F)
Relative humidity	5…95% noncondensing
Atmosphere	Important: The adapter must not be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the adapter is not going to be installed for a period of time, it must be stored in an area where it is not be exposed to a corrosive atmosphere.

Regulatory Compliance

Certification	Specification
UR	UL508
cUR	
CE	EN50178 and EN61800-3
CTick	EN61800-3

This is a product of category C2 according to IEC 61800-3. In a domestic environment, supplementary mitigation measures can be required if this product causes radio interference.

The following terms and abbreviations are used throughout this manual. For definitions of terms not listed here, refer to the Allen-Bradley Industrial Automation Glossary, publication AG-7.1.

A

Adapter Devices such as drives, controllers, and computers usually require an adapter to provide a communication interface between them and a network such as EtherNet/IP network. An adapter reads data on the network and transmits it to the connected device. It also reads data in the device and transmits it to the network.

The 2100-ENET E3 Plus EtherNet/IP network adapter connects multiple devices to an EtherNet/IP network. Adapters are sometimes also called cards, embedded communication options, gateways, modules, and peripherals.

B

Bootstrap Protocol (BOOTP) BOOTP lets the adapter configure itself dynamically at boot time if the network has a BOOTP server. The BOOTP server assigns the adapter a preconfigured IP address, a subnet mask, and a gateway address; therefore, you do not have to configure these by using the parameters in the adapter. BOOTP can make it easier to administer an Ethernet network. A free version of the Rockwell Software® BOOTP Server can be accessed at http://www.software.rockwell.com/support/download/detail.cfm?ID=3390.

Bridge A network device that can route messages from one network to another. A bridge also refers to a communication module in a ControlLogix controller that connects the controller to a network. See also Scanner.

C

Common Industrial Protocol (CIP) CIP is the transport and application layer protocol used for messaging over EtherNet/IP, ControlNet, and DeviceNet networks. The protocol is used for implicit messaging (real-time I/O) and explicit messaging (configuration, data collection, and diagnostics).

ControlFLASH An Allen-Bradley software tool that lets users electronically update firmware on printed circuit boards.

Controller A controller, also called programmable logic controller, is a solid-state control system that has a user-programmable memory for storage of instructions to implement specific functions such as I/O control, logic, timing, counting, report generation, communication, arithmetic, and data file manipulation. A controller consists of a central processor, input/output interface, and memory. See also Scanner.

D

Data Rate The speed at which data is transferred on the EtherNet/IP network.

Duplex Duplex describes the mode of communication. Full-duplex communication lets a device exchange data in both directions at the same time. Half-duplex communication lets a device exchange data only in one direction at a time. The duplex used by the adapter depends on the type of duplex that other network devices, such as switches, support.

E

Electronic Data Sheet (EDS) Files Simple text files that are used by network configuration tools such as RSNetWorx for EtherNet to describe products so that you can easily commission them on a network. EDS files describe a product device type and revision. EDS files for many Allen-Bradley products can be found at http://www.ab.com/networks/eds.

EtherNet/IP Network EtherNet/IP (Industrial Protocol) is an open producer-consumer communication network based on the Ethernet standard (IEEE 802.3), TCP/IP, UDP/IP, and CIP. Designed for industrial communication, both I/O and explicit messages can be transmitted over the network. Each device is assigned a unique IP address and transmits data on the network. The number of devices that an EtherNet/IP network can support depends on the class of IP address. For example, a network with a Class C IP address can have 254 nodes.

General information about EtherNet/IP network and the EtherNet/IP network specification are maintained by the Open DeviceNet Vendor's Association (ODVA). ODVA is online at http://www.odva.org.

Explicit Messaging Explicit Messages are used to transfer data that does not require continuous updates. They are typically used to configure, monitor, and diagnose devices over the network.

G

Gateway A device on a network that connects an individual network to a system of networks. When a node needs to communicate with a node on another network, a gateway transfers the data between the two networks. You need to configure the address for the gateway device in the adapter if you want the adapter to communicate with devices that are not on its network.

H

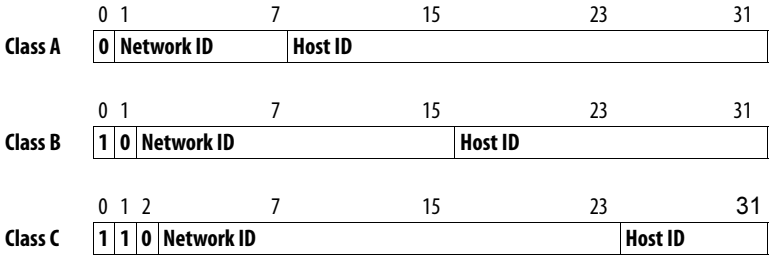
Hardware Address Each Ethernet device has a unique hardware address (sometimes called a MAC address) that is 48 bits. The address appears as six digits separated by colons (for example, xx:xx:xx:xx:xx:xx). Each digit has a value between 0 and 255 (0x00 and 0xFF). This address is assigned in the hardware and cannot be changed. It is required to identify the device if you are using a BOOTP utility.

I

I/O Data I/O data, sometimes called implicit messages or input/output, is time-critical data such as a Logic Command and Reference. The terms input and output are defined from the controller's point of view. Output is produced by the controller and consumed by the adapter. Input is produced by the adapter and consumed by the controller.

IP Addresses A unique IP address identifies each node on an EtherNet/IP network. An IP address consists of 32 bits that are divided into four segments of one byte each. It appears as four decimal integers separated by periods (xxx.xxx.xxx.xxx). Each 'xxx' can have a decimal value from 0...255. For example, an IP address could be 192.168.0.1.

An IP address has two parts: a network ID and a host ID. The class of network determines the format of the address.



The number of devices on your EtherNet/IP network varies depending on the number of bytes that are used for the network address. In many cases you are given a network with a Class C address, in which the first three bytes contain the network address (subnet mask = 255.255.255.0). This leaves 8 bits or 256 addresses on your network. Because two addresses are reserved for special uses (0 is an address for the network usually used by the router, and 255 is an address for broadcast messages to all network devices), you have 254 addresses to use on a Class C address block.

To be sure that each device on the Internet has a unique address, contact your network administrator or Internet Service Provider for unique fixed IP addresses. You can then set the unique IP address for the adapter by using a BOOTP server or by manually configuring parameters in the adapter. The adapter reads the values of these parameters only at powerup.

M

Master-Slave Hierarchy An adapter configured for a master-slave hierarchy exchanges data with the master device. Usually, a network has one scanner that is the master device, and all other devices (for example, E3 Plus overloads connected to EtherNet/IP network adapters) are slave devices.

On a network with multiple scanners (called a multimaster hierarchy), each slave device must have a scanner specified as a master.

N

Nonvolatile Storage (NVS) NVS is the permanent memory of a device. Devices such as the adapter and E3 Plus module store parameters and other information in NVS so that they are not lost when the device loses power. NVS is sometimes called EEPROM.

P

Ping A message that is sent by one end device to its peripheral devices. They use the ping to gather data about the product, including whether it can receive messages and whether they can log in for control. On an EtherNet/IP network, a ping can be used to determine if a node exists.

R

RSLogix 5, RSLogix 500, and RSLogix 5000 Software RSLogix software is a tool for configuring and monitoring controllers to communicate with connected devices. It is a 32-bit application that runs on various Windows operating systems. Information about RSLogix software can be found at http://www.software.rockwell.com/rslogix.

S

Scanner A scanner is a separate module (of a multi-module controller) or a built-in component (of a single-module controller) that provides communication with adapters connected to a network. See also Controller.

Status Indicators Status indicators are LEDs that are used to report the status of the adapter, network, and end device. They are on the front face of the adapter.

Subnet Mask An extension to the IP addressing scheme that lets you use a single network ID for multiple physical networks. A bit mask identifies the part of the address that specifies the network and the part of the address that specifies the unique node on the network. A '1' in the subnet mask indicates the bit is used to specify the network. A '0' in the subnet mask indicates that the bit is used to specify the node.

For example, a subnet mask on a network can appear as follows: 11111111 11111111 11111111 11000000 (255.255.255.192). This mask indicates that 26 bits are used to identify the network and 6 bits are used to identify devices on each network. Instead of a single physical Class C network with 254 devices, this subnet mask divides it into four networks with up to 62 devices each.

Switches Network devices that provide virtual connections that help to control collisions and reduce traffic on the network. They are able to reduce network congestion by transmitting packets to an individual port only if they are destined for the connected device. In a control application, in which real time data access is critical, network switches can be required in place of hubs.

T

Transmission Control Protocol (TCP) EtherNet/IP network uses this protocol to transfer Explicit Messaging packets by using IP. TCP guarantees delivery of data through the use of retries.

U

User Datagram Protocol (UDP) EtherNet/IP network uses this protocol to transfer I/O packets by using IP. UDP provides a simple, but fast capability to send I/O messaging packets between devices. This protocol ensures that adapters transmit the most recent data because it does not use acknowledgements or retries.

Update The process of updating firmware in a device. The adapter can be updated by using various Allen-Bradley software tools. Refer to Update the Adapter on page 24 for more information.

Notes:

T

U

W

Z

Notes:

Notes:

Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support, you can find technical manuals, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools. You can also visit our Knowledgebase at http://www.rockwellautomation.com/knowledgebase for FAQs, technical information, support chat and forums, software updates, and to sign up for product notification updates.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect^{SM} support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/rockwellautomation/support/overview.page, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to help ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication RA-DU002, available at http://www.rockwellautomation.com/literature/.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 2100-UM006A-EN-P - July 2013